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(54) **CUSTOMIZED DIGITAL AVATAR ACCESSORIES**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 52 days.

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(51) **Int. Cl.**

H04L 12/58	(2006.01)
H04L 29/08	(2006.01)
G06F 16/58	(2019.01)
G06T 11/60	(2006.01)

(52) **U.S. Cl.**
CPC ***H04L 51/046*** (2013.01); ***G06F 16/5866*** (2019.01); ***H04L 51/10*** (2013.01); ***H04L 51/16*** (2013.01); ***H04L 51/32*** (2013.01); ***H04L 67/10*** (2013.01); ***H04L 67/306*** (2013.01); *G06T 11/60* (2013.01)

(58) **Field of Classification Search**
CPC H04L 67/02; H04L 67/2823; H04L 67/10; H04L 51/046; H04L 51/10; H04L 51/16; H04L 51/32; H04L 67/306; G06F 16/5866; G06T 11/60
USPC 709/201, 206; 715/706, 753, 764; 707/812
See application file for complete search history.

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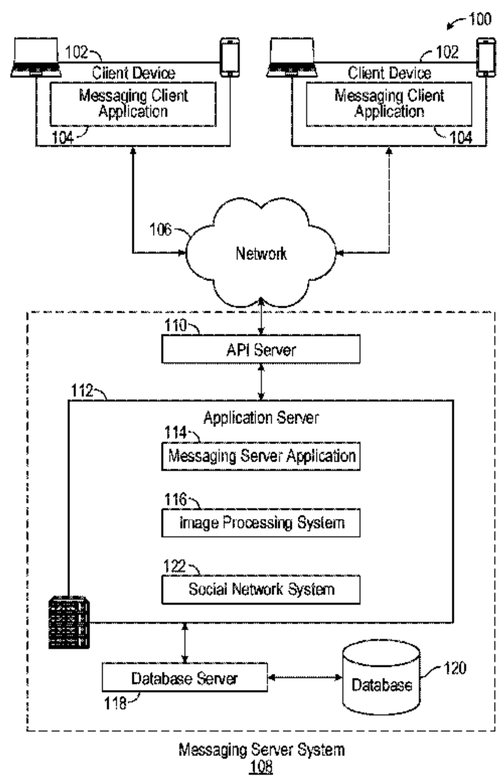
(57) **ABSTRACT**

Among other things, embodiments of the present disclosure improve the functionality of electronic messaging software and systems by generating customized images with avatars of different users within electronic messages. For example, users of different mobile computing devices can exchange electronic communications with images generated to include avatars representing themselves as well as their friends, colleagues, and other acquaintances.

15 Claims, 20 Drawing Sheets



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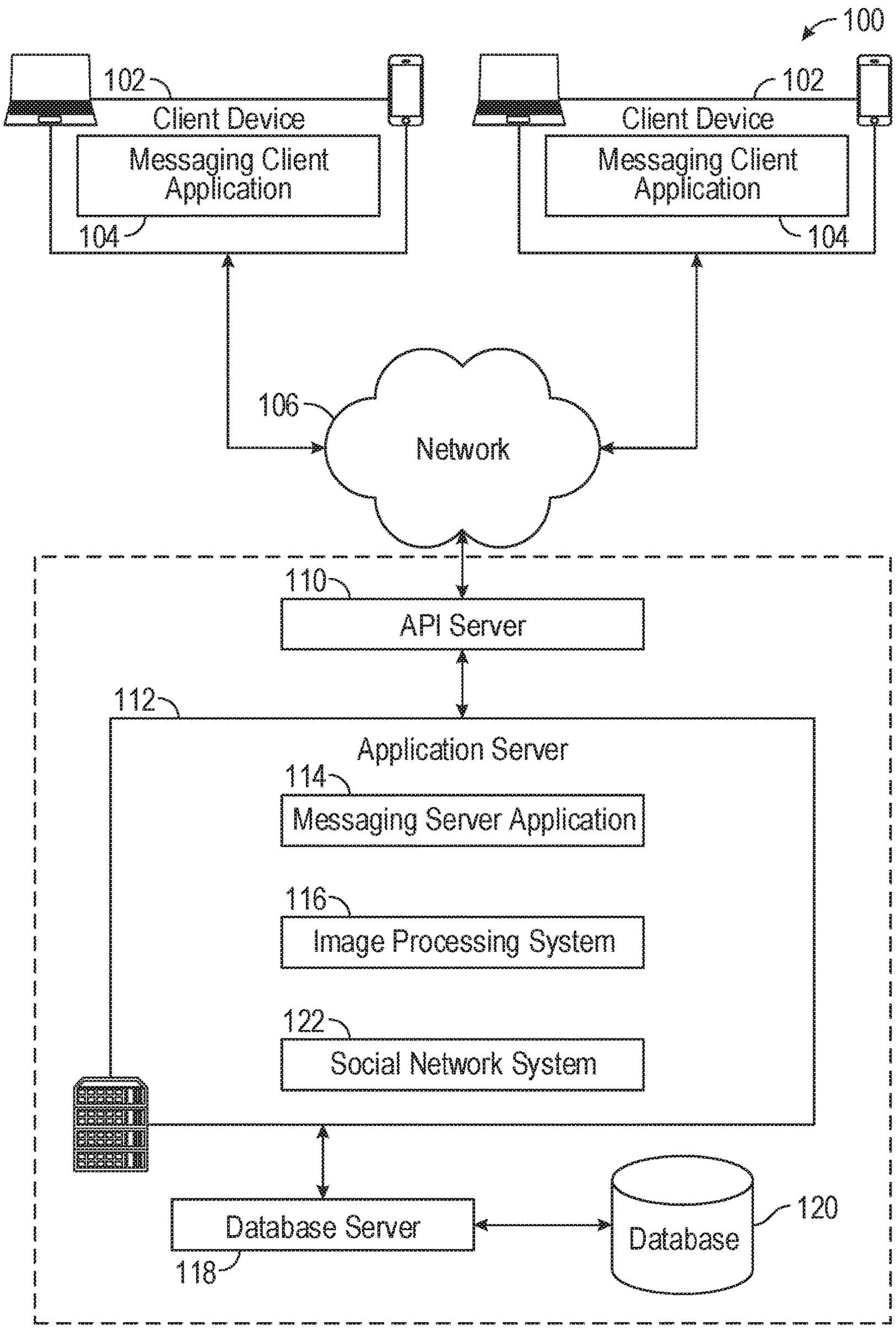
100
102
Client Device
Messaging Client Application
104
102
Client Device
Messaging Client Application
104
106
Network
110
API Server
112
Application Server
114
Messaging Server Application
116
Image Processing System
122
Social Network System
Database Server
118
Database
120
Messaging Server System
108

FIG. 1

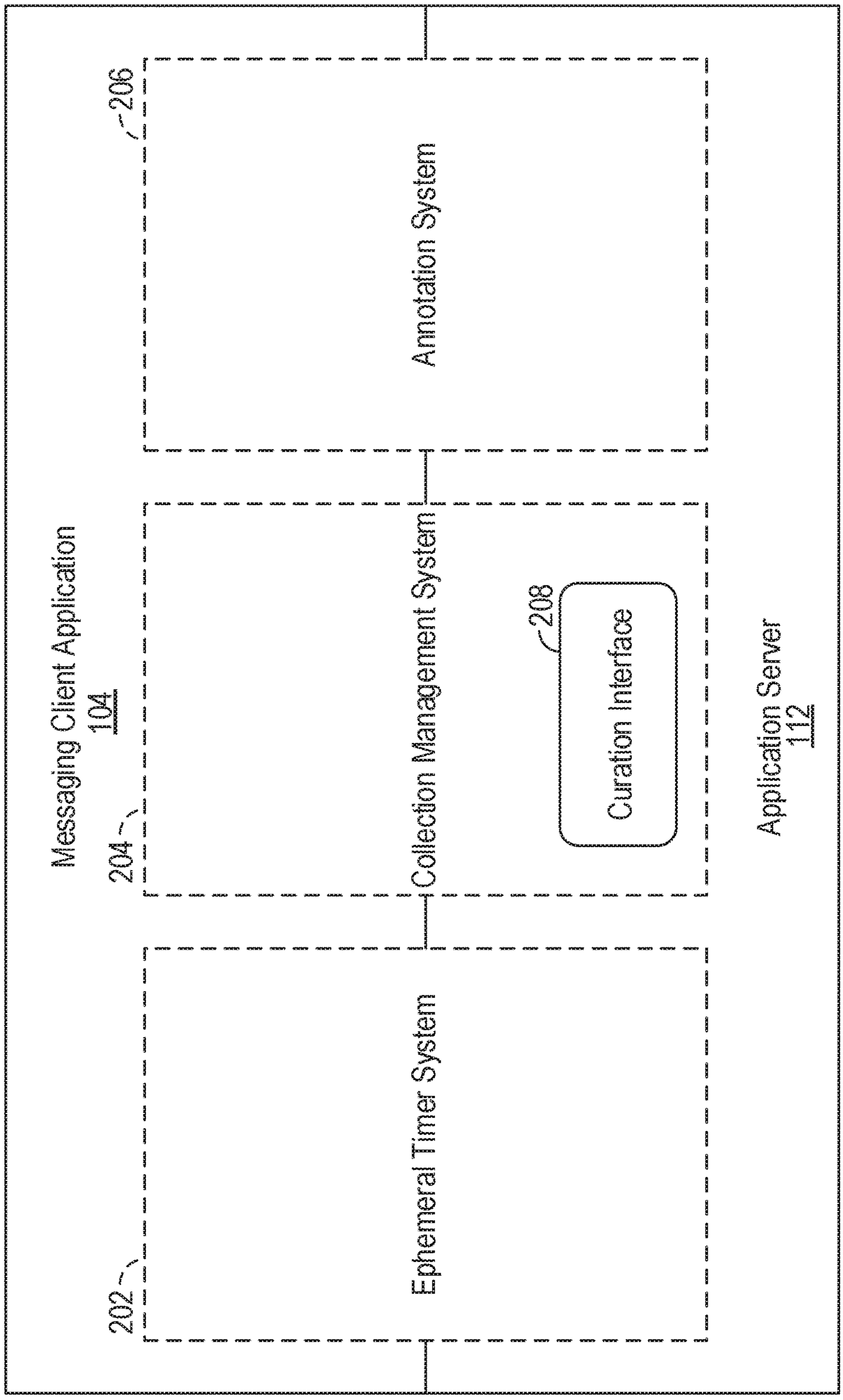
100
Messaging Client Application
104
206
Annotation System
204
Collection Management System
208
Curation Interface
Application Server
112
202
Ephemeral Timer System

FIG. 2

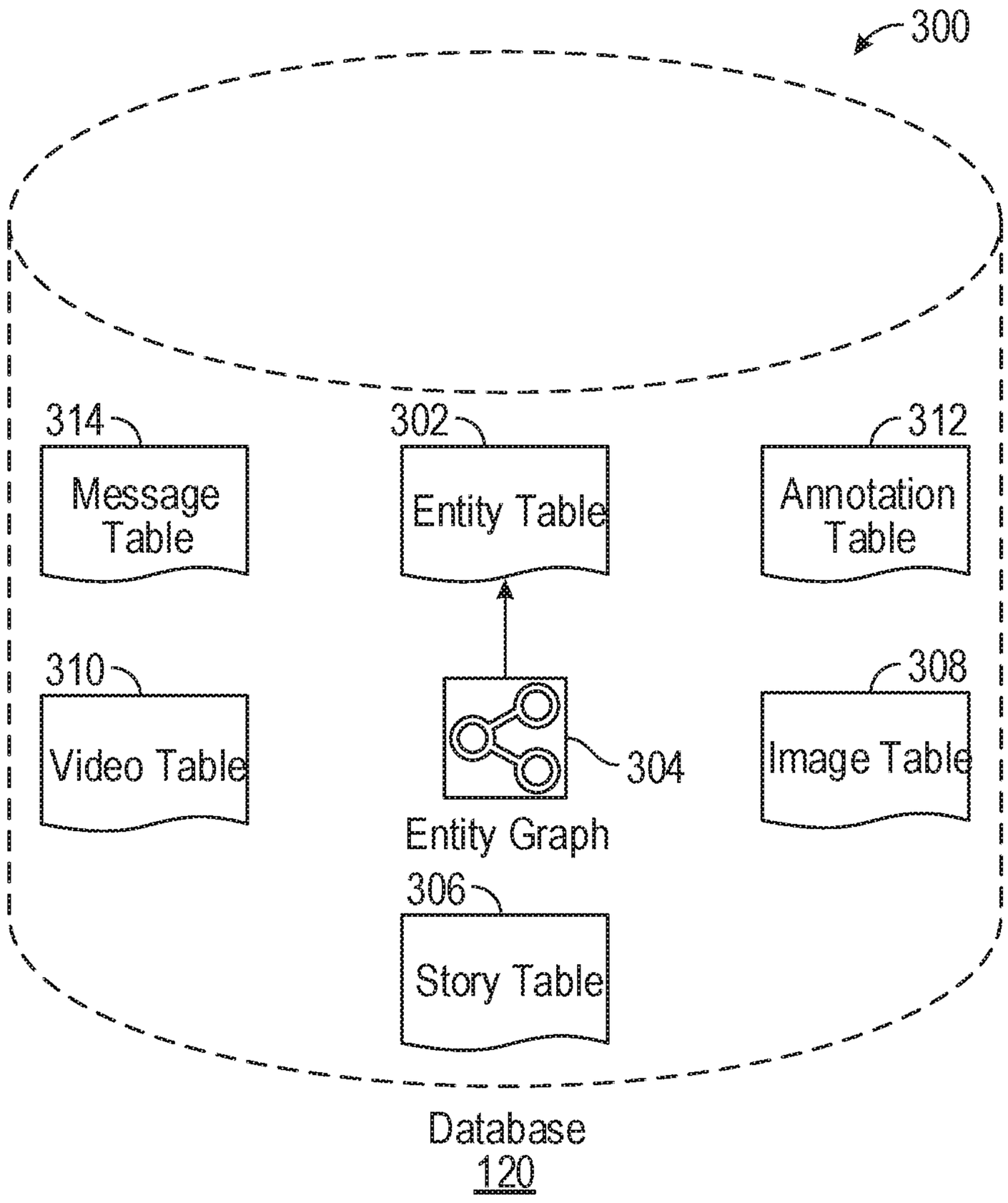
300
314
Message Table
302
Entity Table
312
Annotation Table
310
Video Table
304
Entity Graph
308
Image Table
306
Story Table
Database
120

FIG. 3

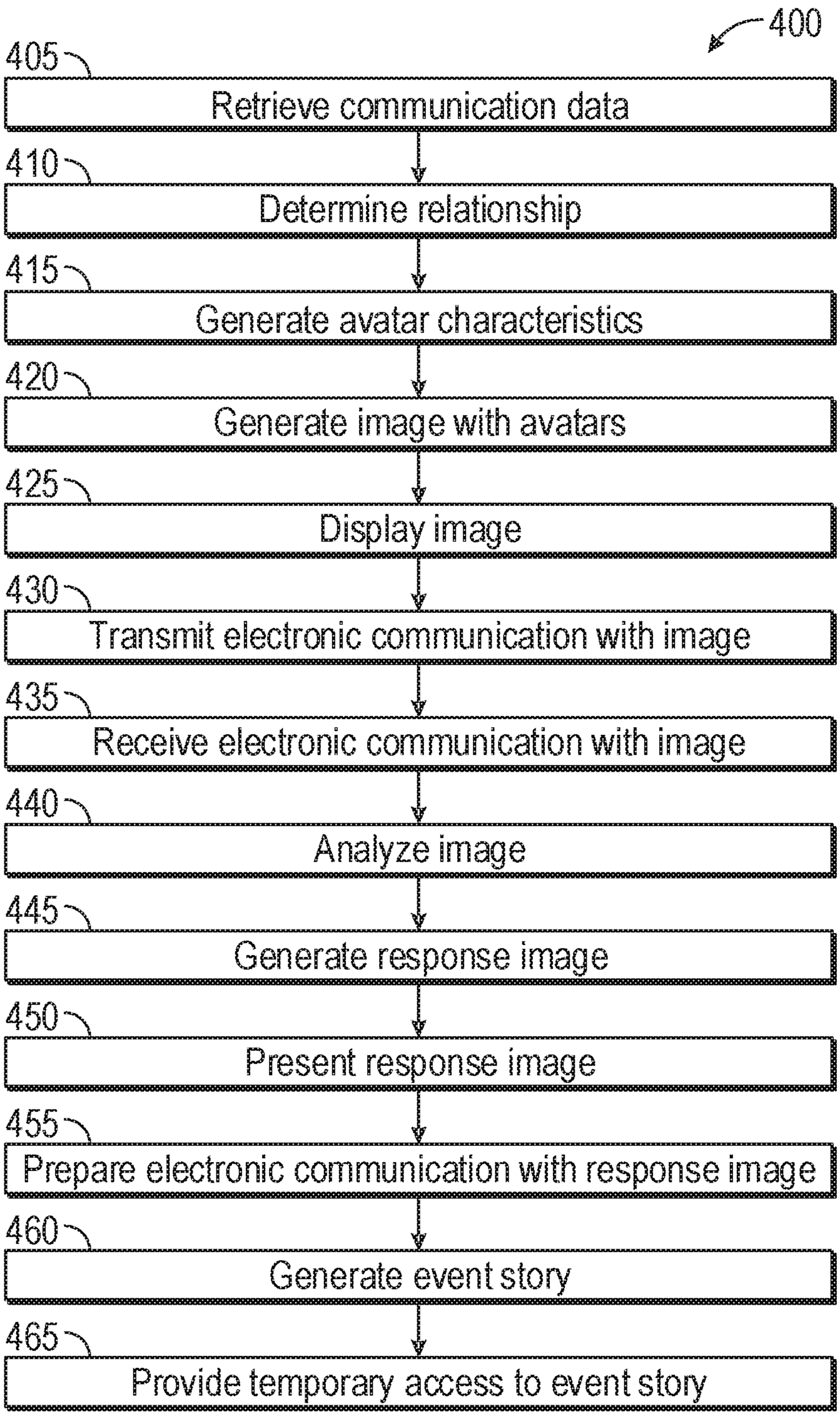
400
405
Retrieve communication data
410
Determine relationship
415
Generate avatar characteristics
420
Generate image with avatars
425
Display image
430
Transmit electronic communication with image
435
Receive electronic communication with image
440
Analyze image
445
Generate response image
450
Present response image
455
Prepare electronic communication with response image
460
Generate event story
465
Provide temporary access to event story

FIG. 4

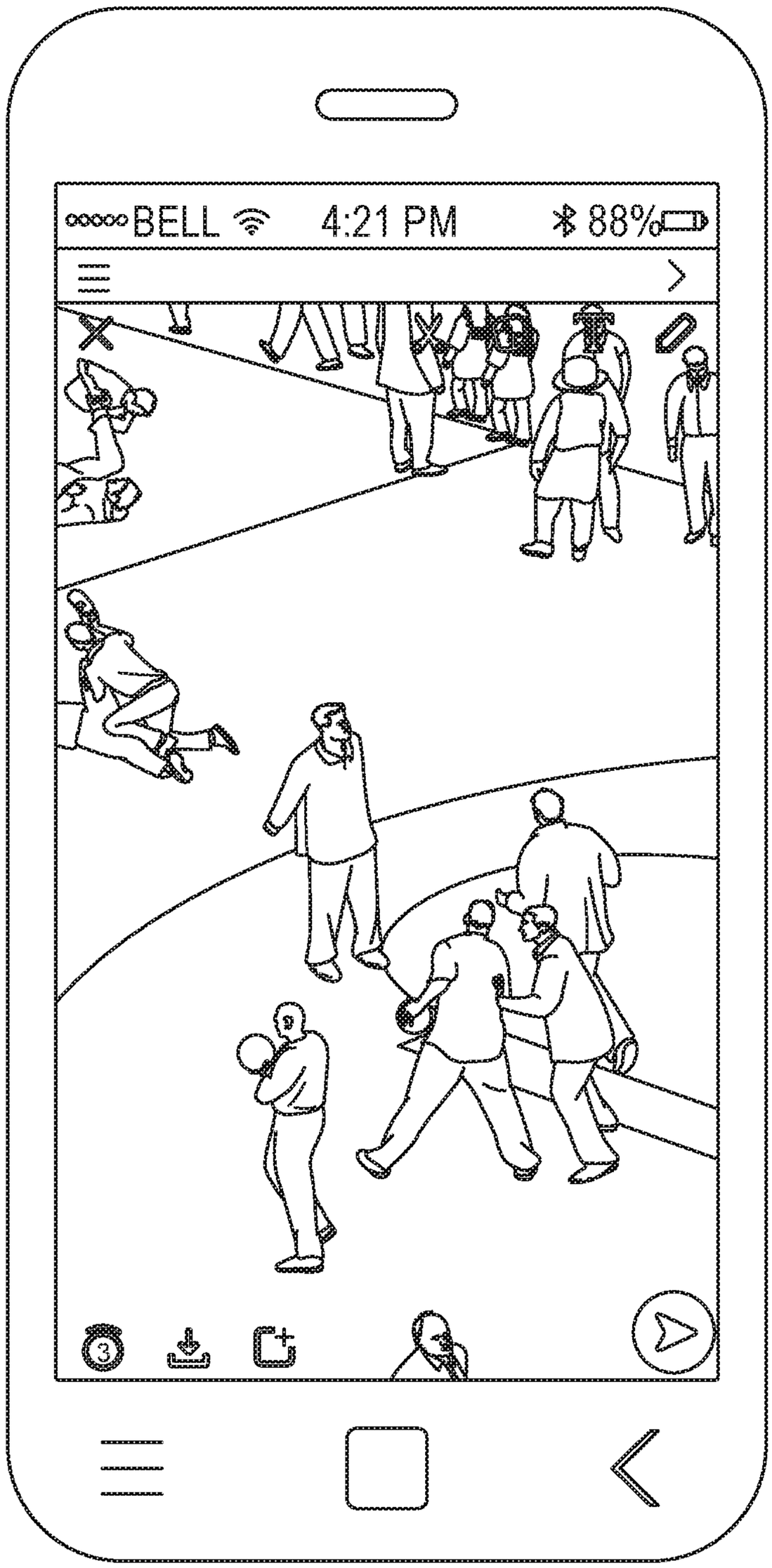

FIG. 5A

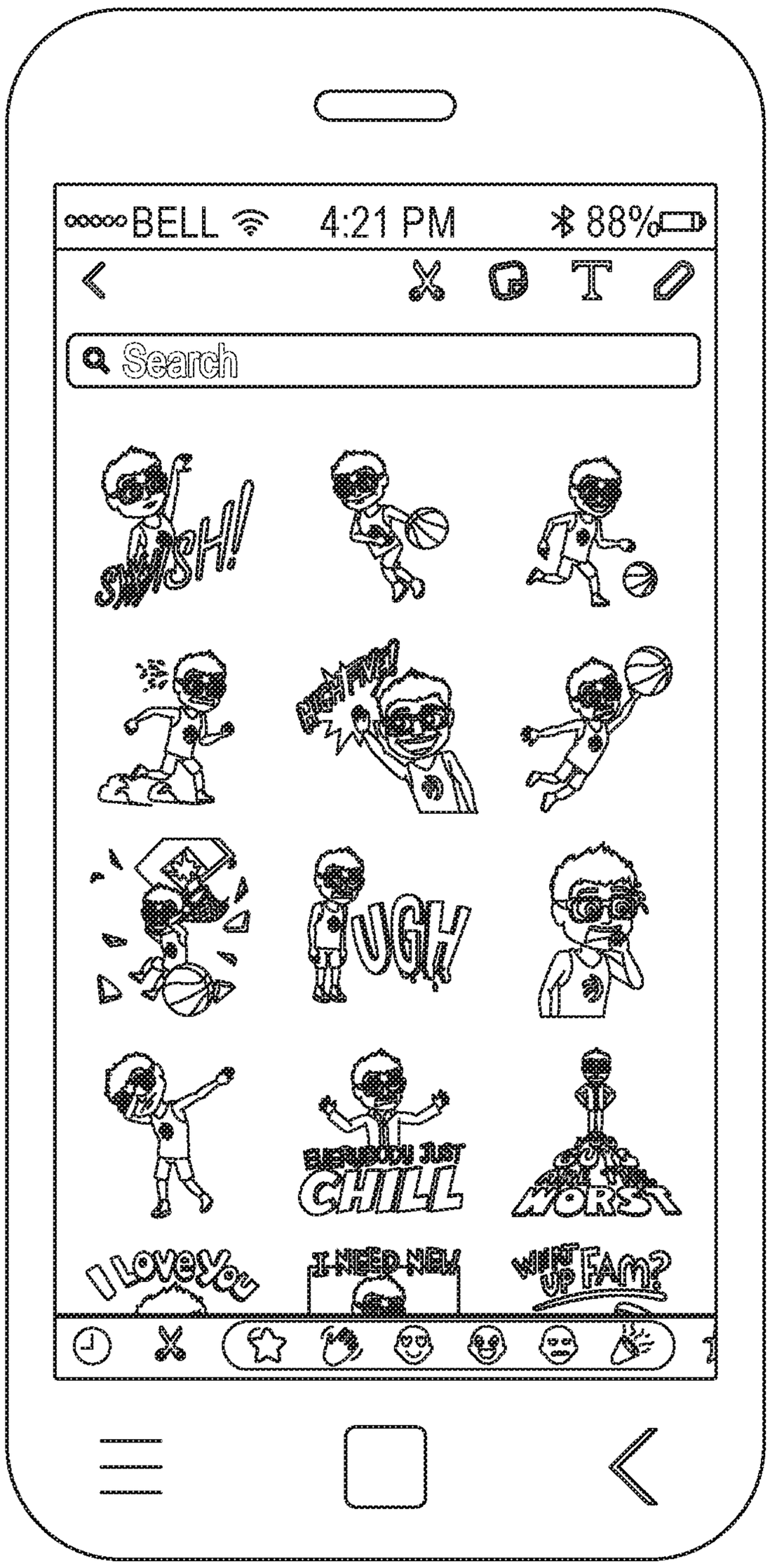
BELL
4:21 PM
88%
Search
SWISH!
HIGH FIVE!
UGH
JUST CHILL
WORST
I LOVE YOU
I NEED NEW
WHAT'S UP FAM?

FIG. 5B

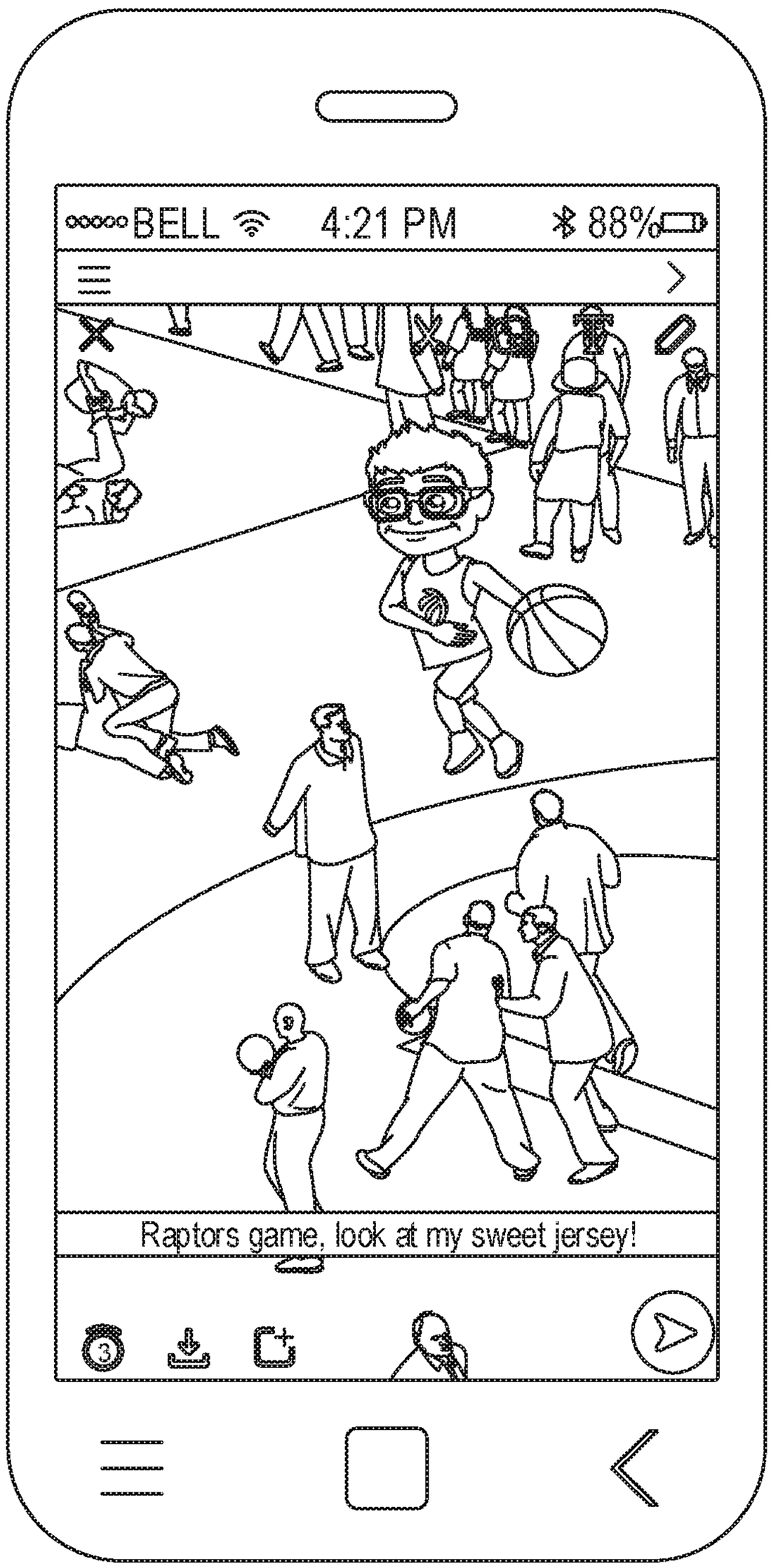

FIG. 5C

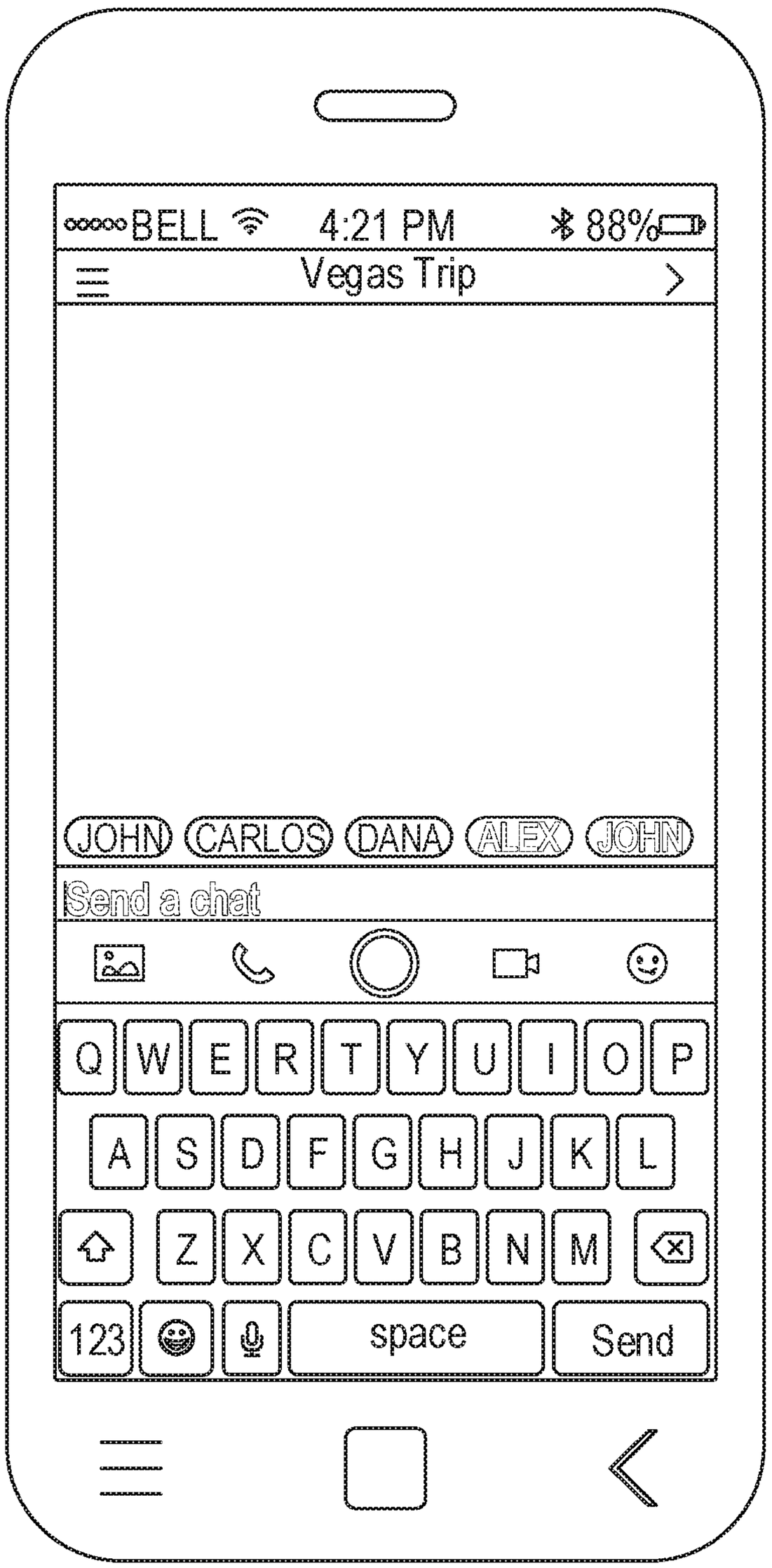
BELL
4:21 PM
88%
Vegas Trip
JOHN
CARLOS
DANA
ALEX
JOHN
Send a chat
Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
123
space
Send

FIG. 5D

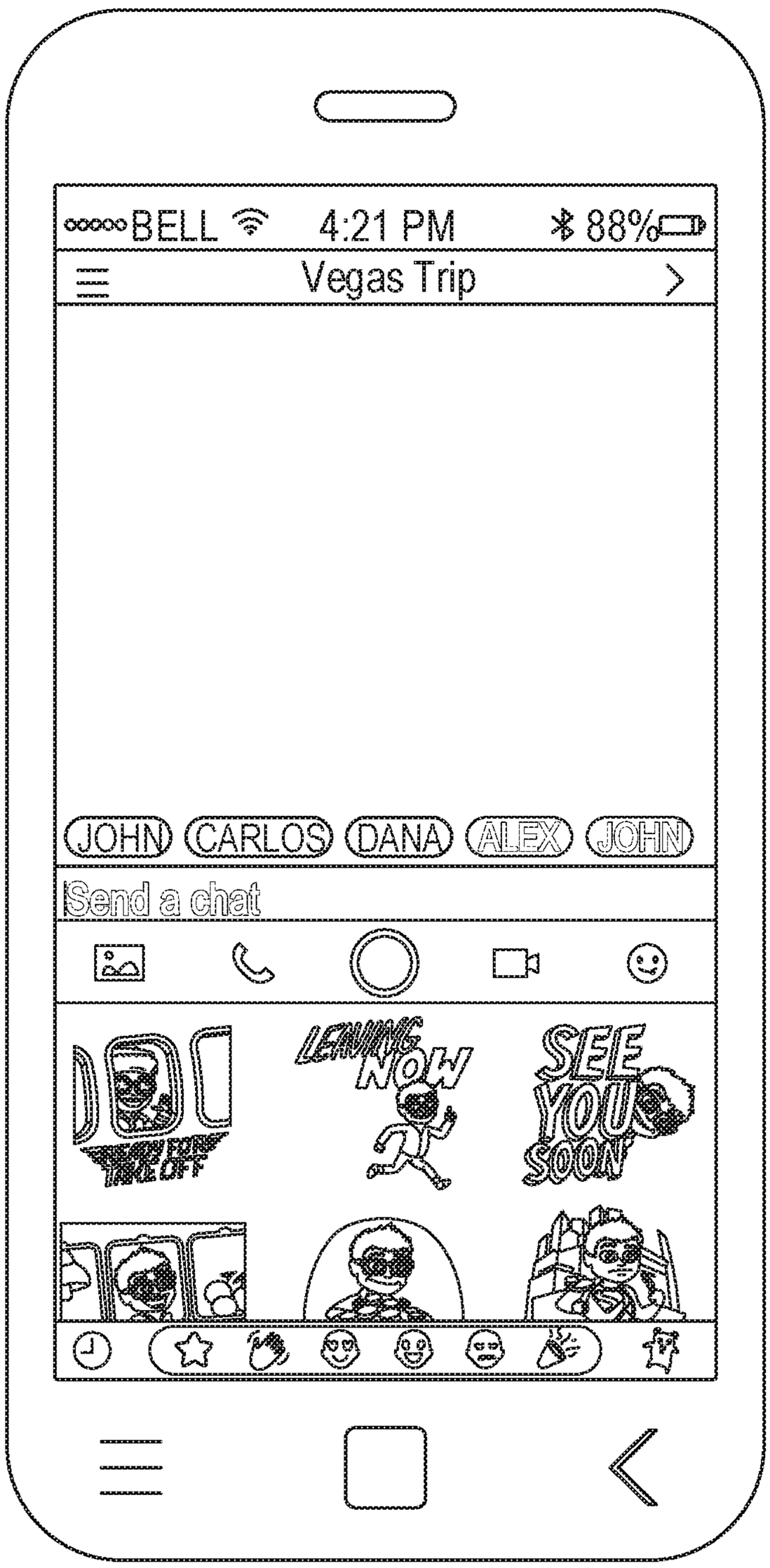
BELL
4:21 PM
88%
Vegas Trip
JOHN
CARLOS
DANA
ALEX
JOHN
Send a chat
LEAVING NOW
SEE YOU SOON

FIG. 5E


BELL
4:21 PM
88%
Vegas Trip
Today
Matt
READY FOR TAKE OFF
JOHN
CARLOS
DANA
ALEX
JOHN
Send a chat
LEAVING NOW
SEE YOU SOON

FIG. 5F

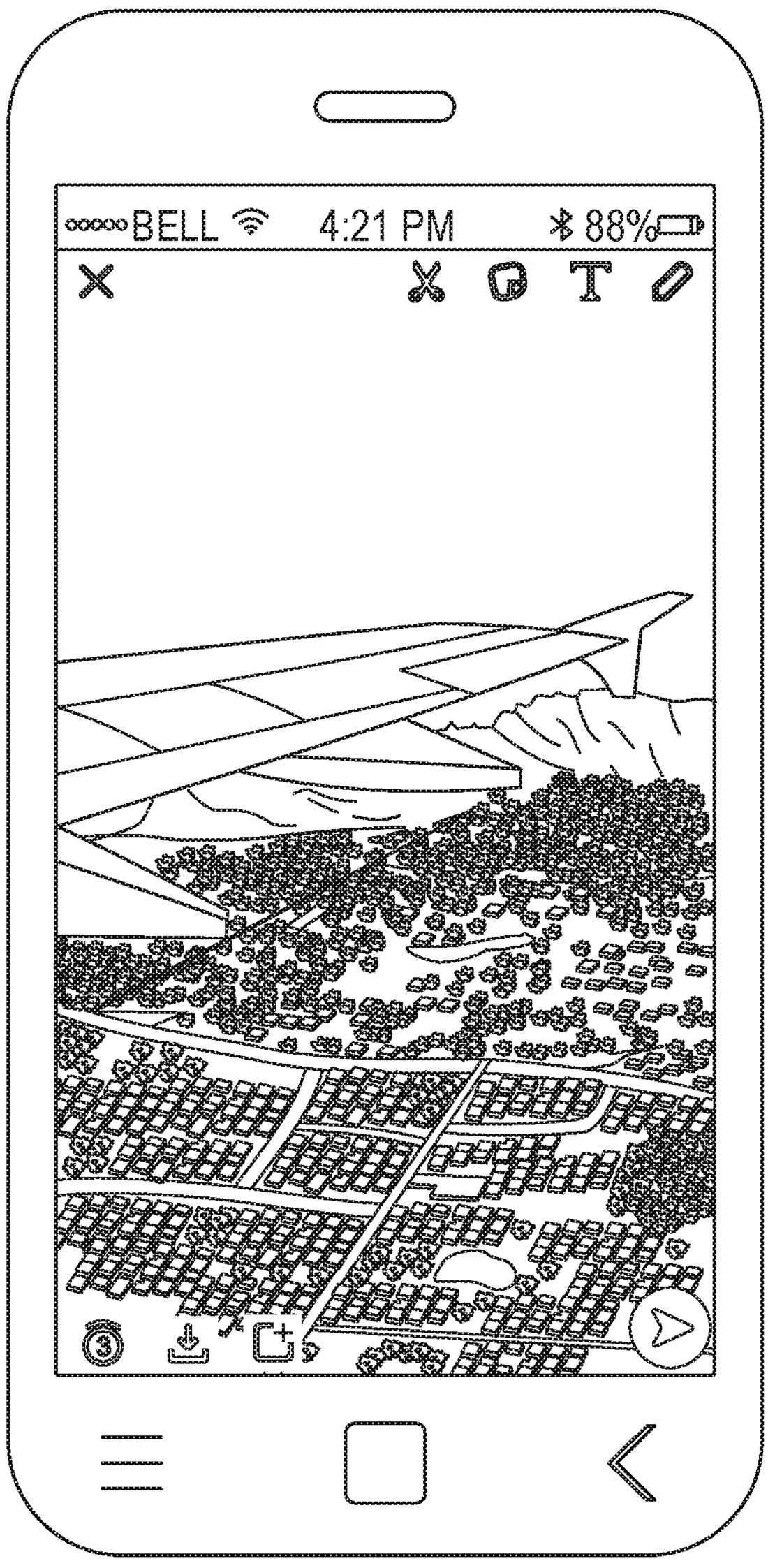

FIG. 5G

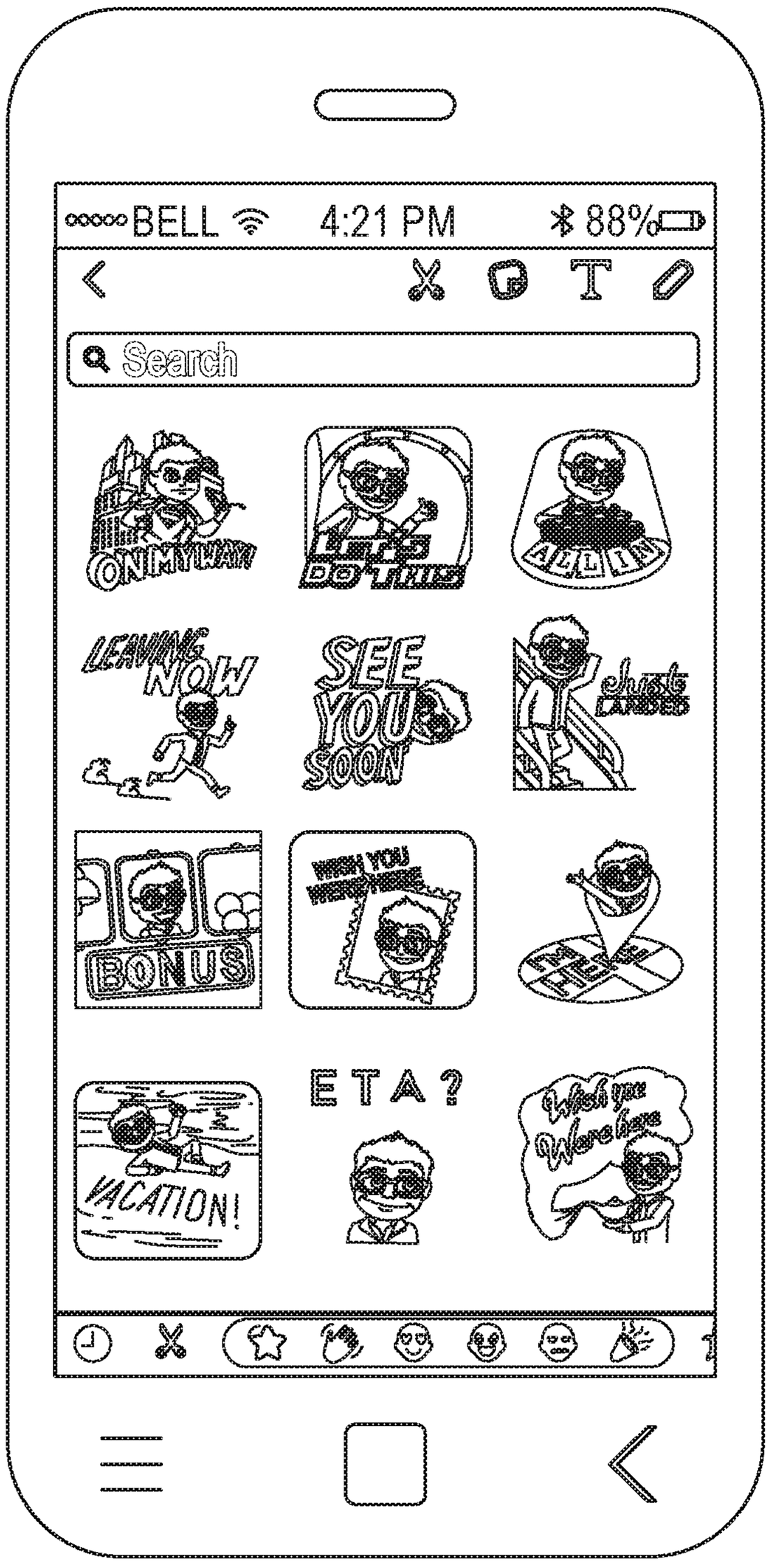
BELL
4:21 PM
88%
Search
ON MY WAY
DO THIS
ALL IN
LEAVING NOW
SEE YOU SOON
Thank you
BONUS
THANK YOU
HERE
VACATION!
ETA?
Wish you were here

FIG. 5H

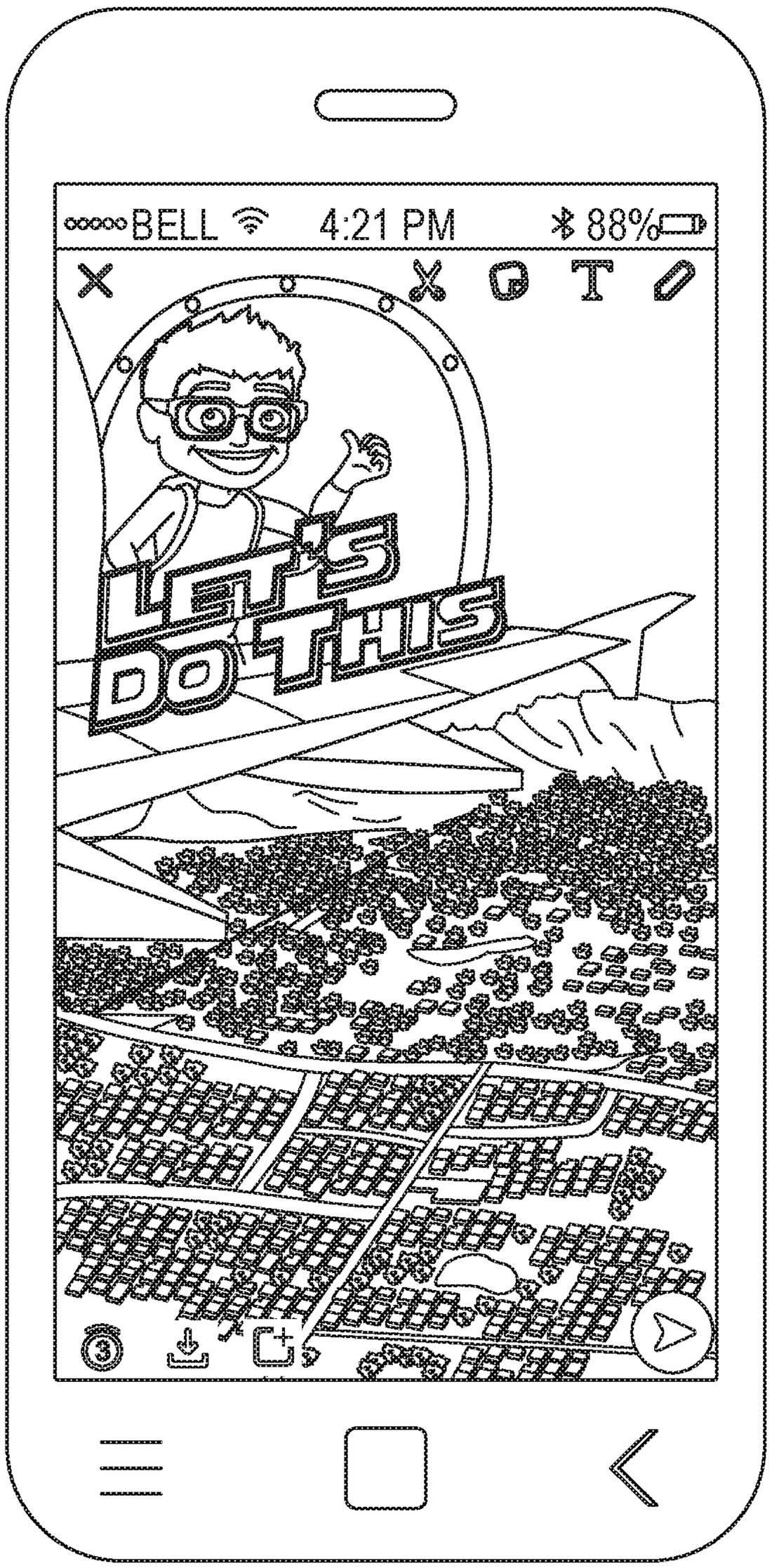

FIG. 5I

FIG. 5J

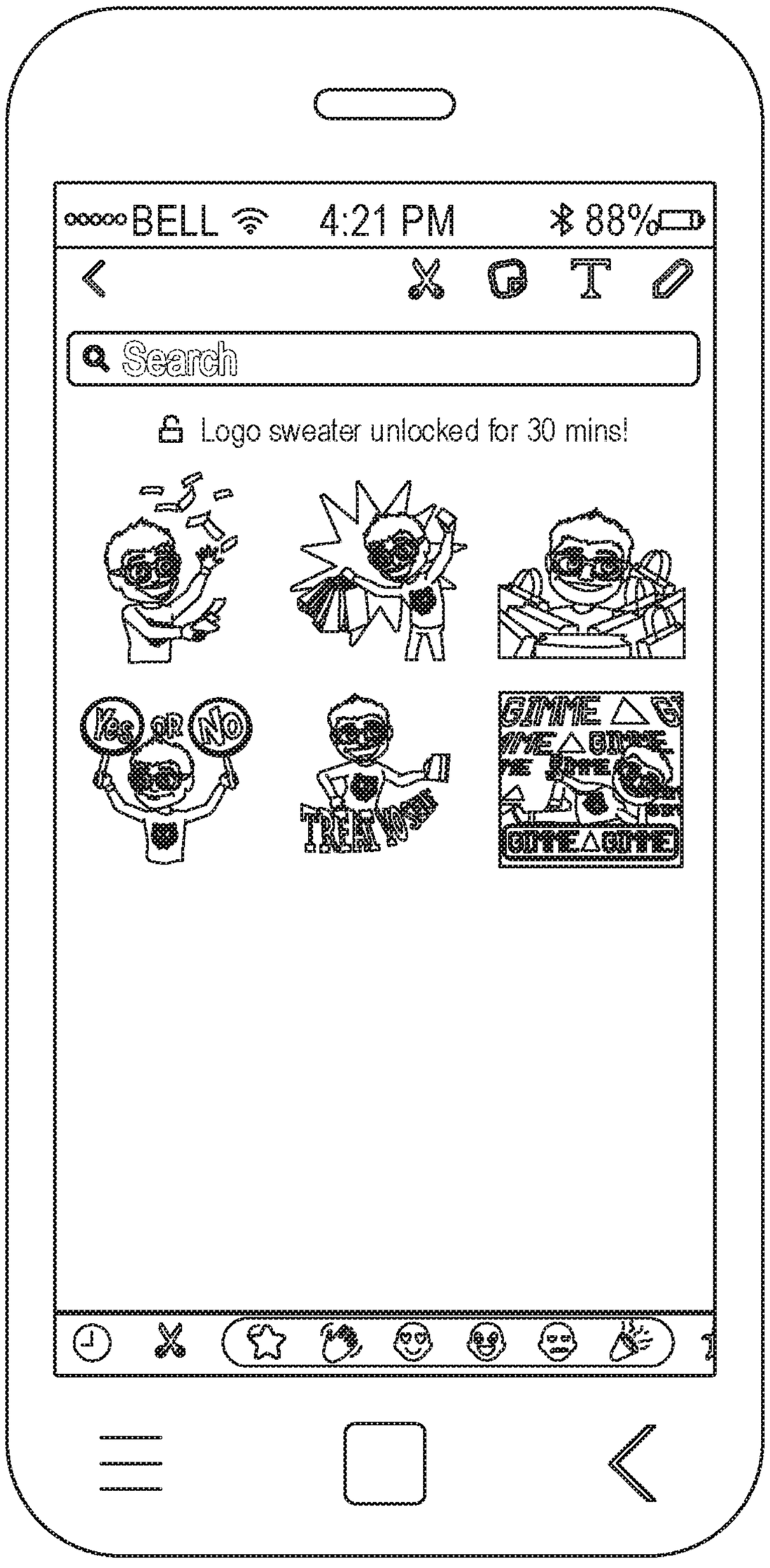
BELL
4:21 PM
88%
Search
Logo sweater unlocked for 30 mins!
Yes OR No
TREAT YOSELF
GIMME
GIMME

FIG. 5K

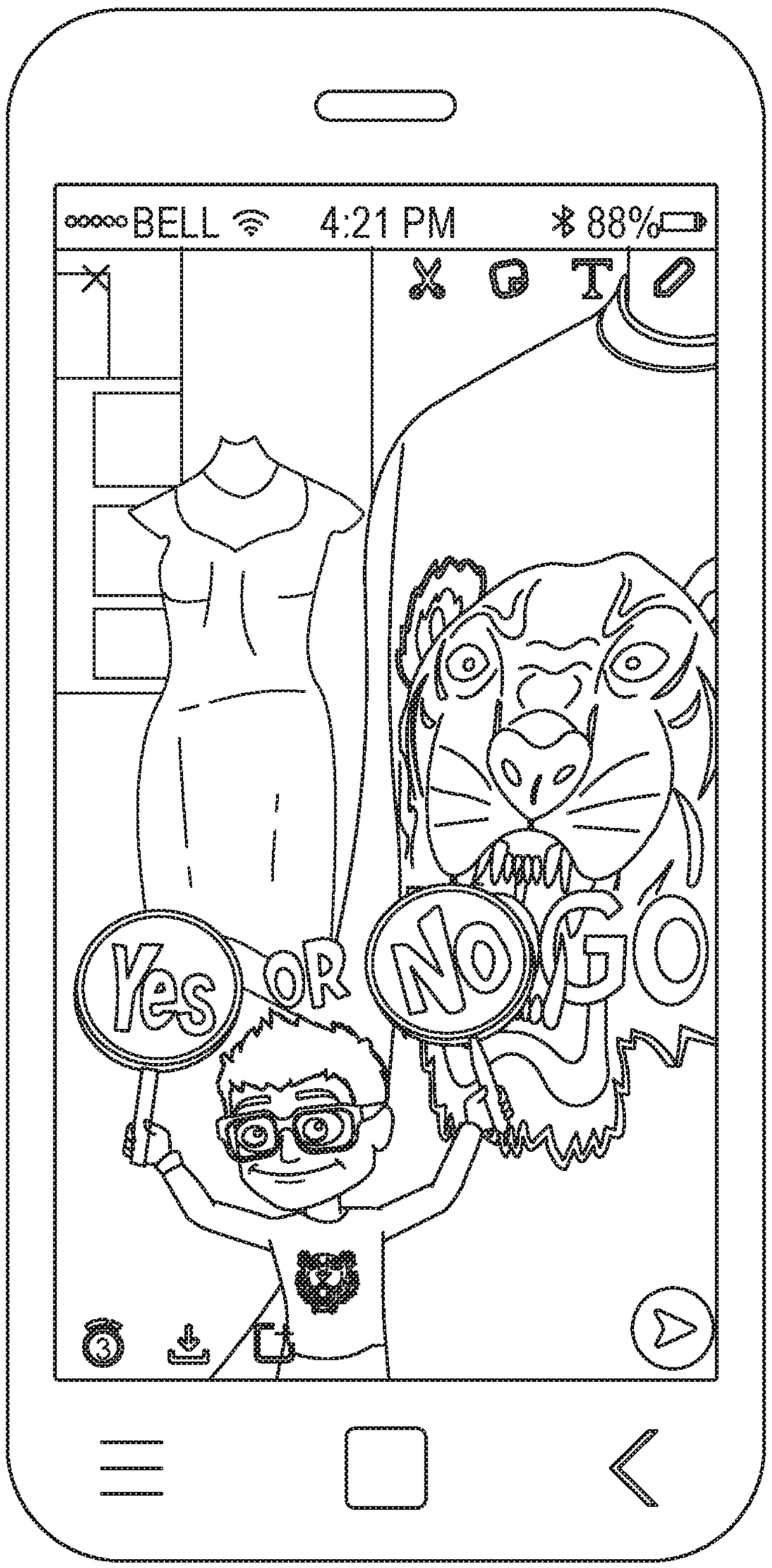

FIG. 5L

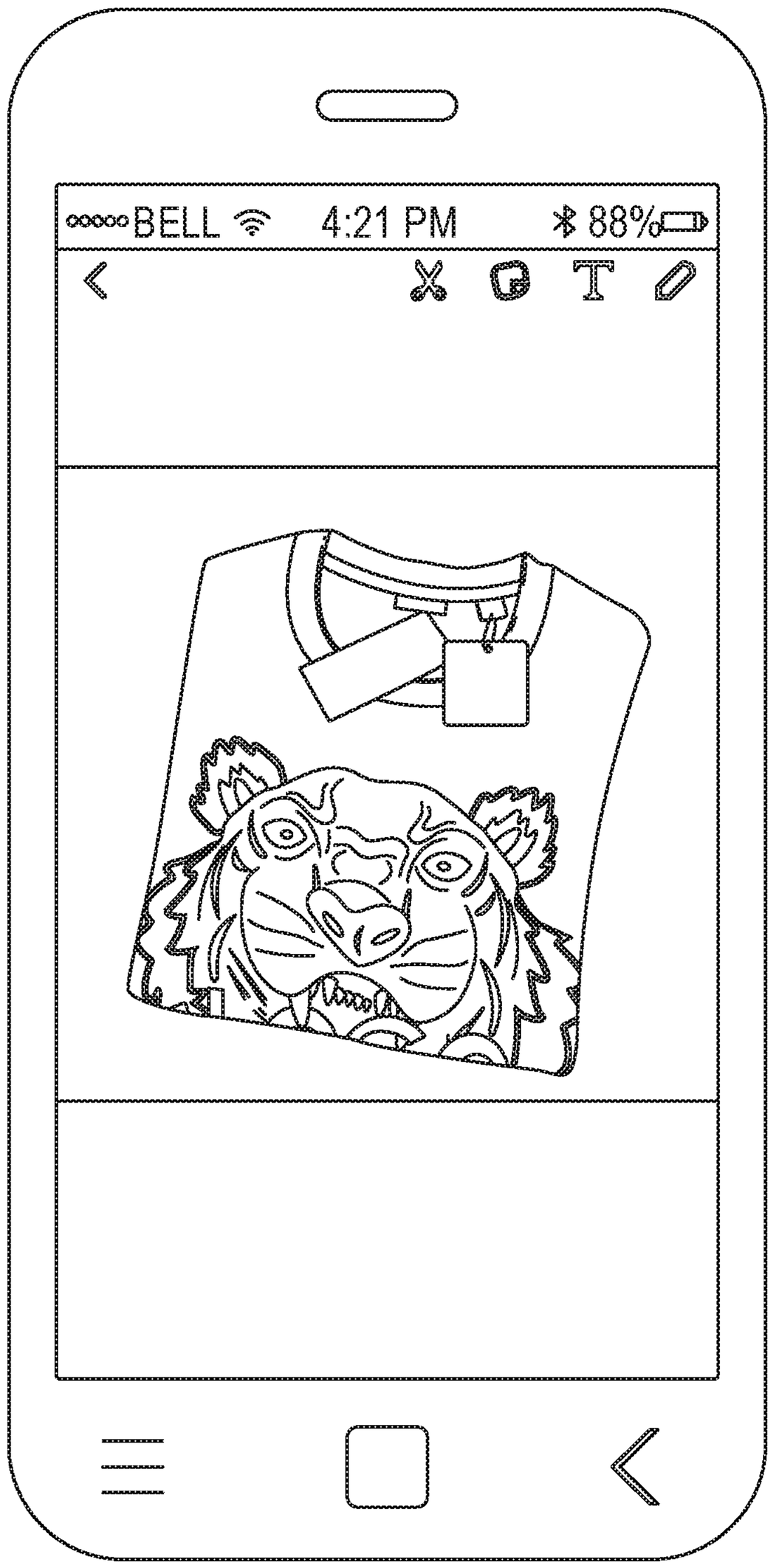

FIG. 5M

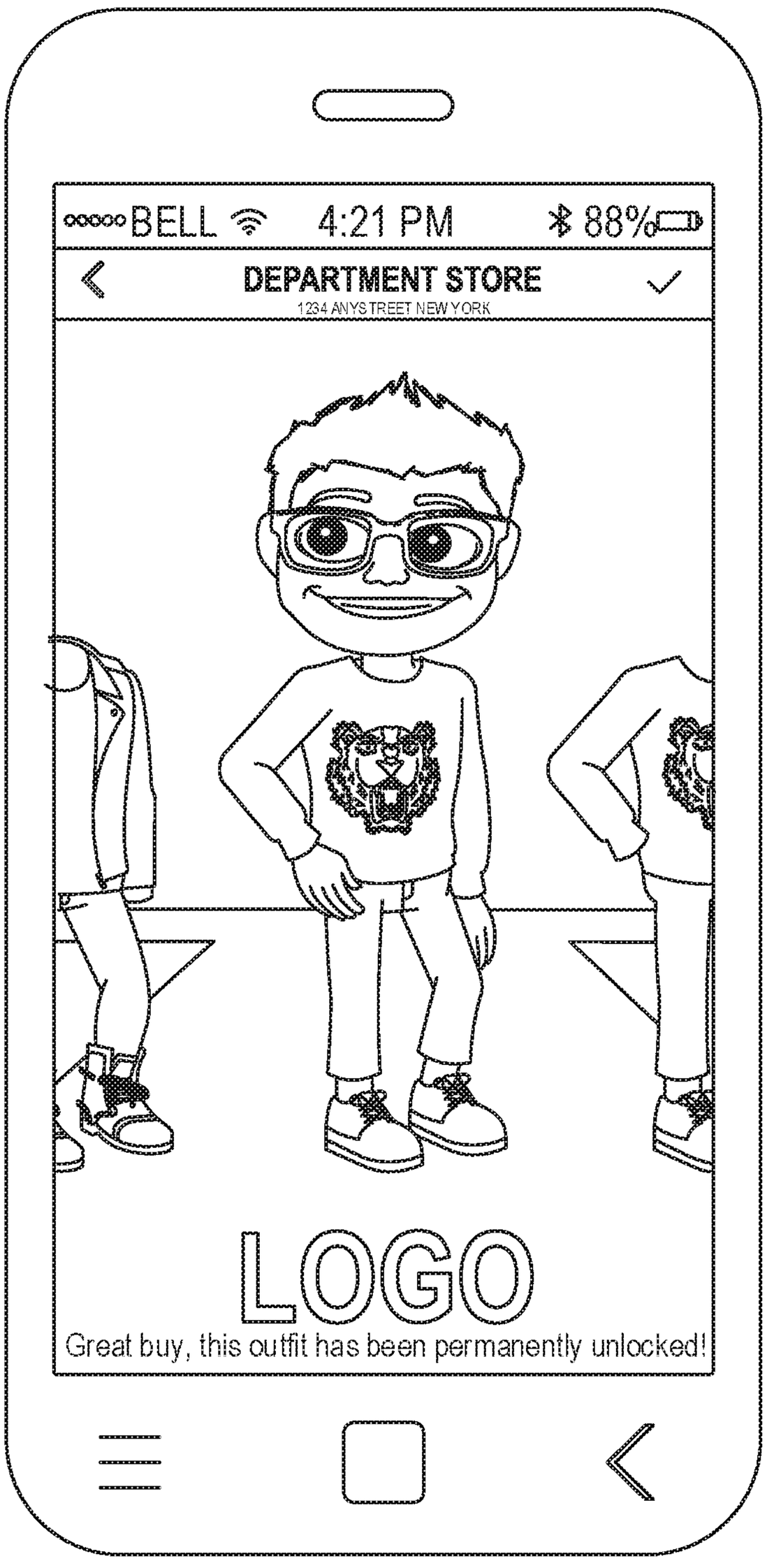
BELL
4:21 PM
88%
DEPARTMENT STORE
1234 ANY STREET NEW YORK
LOGO
Great buy, this outfit has been permanently unlocked!

FIG. 5N

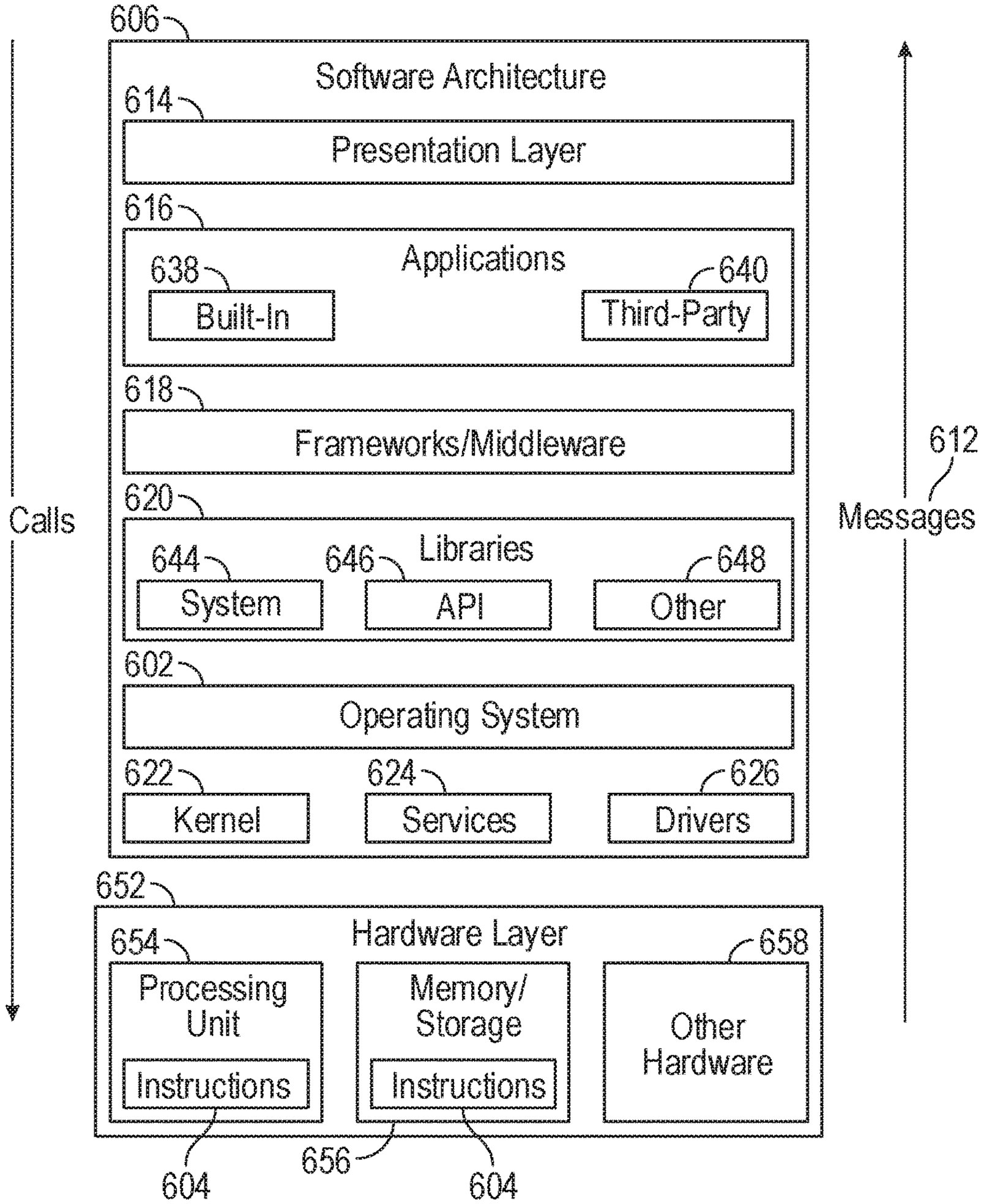
606
Software Architecture
614
Presentation Layer
616
Applications
638
Built-In
640
Third-Party
618
Frameworks/Middleware
620
Libraries
644
System
646
API
648
Other
602
Operating System
622
Kernel
624
Services
626
Drivers
608
API Calls
612
Messages
652
Hardware Layer
654
Processing Unit
Instructions
Memory/ Storage
Instructions
658
Other Hardware
604
656
604

FIG. 6

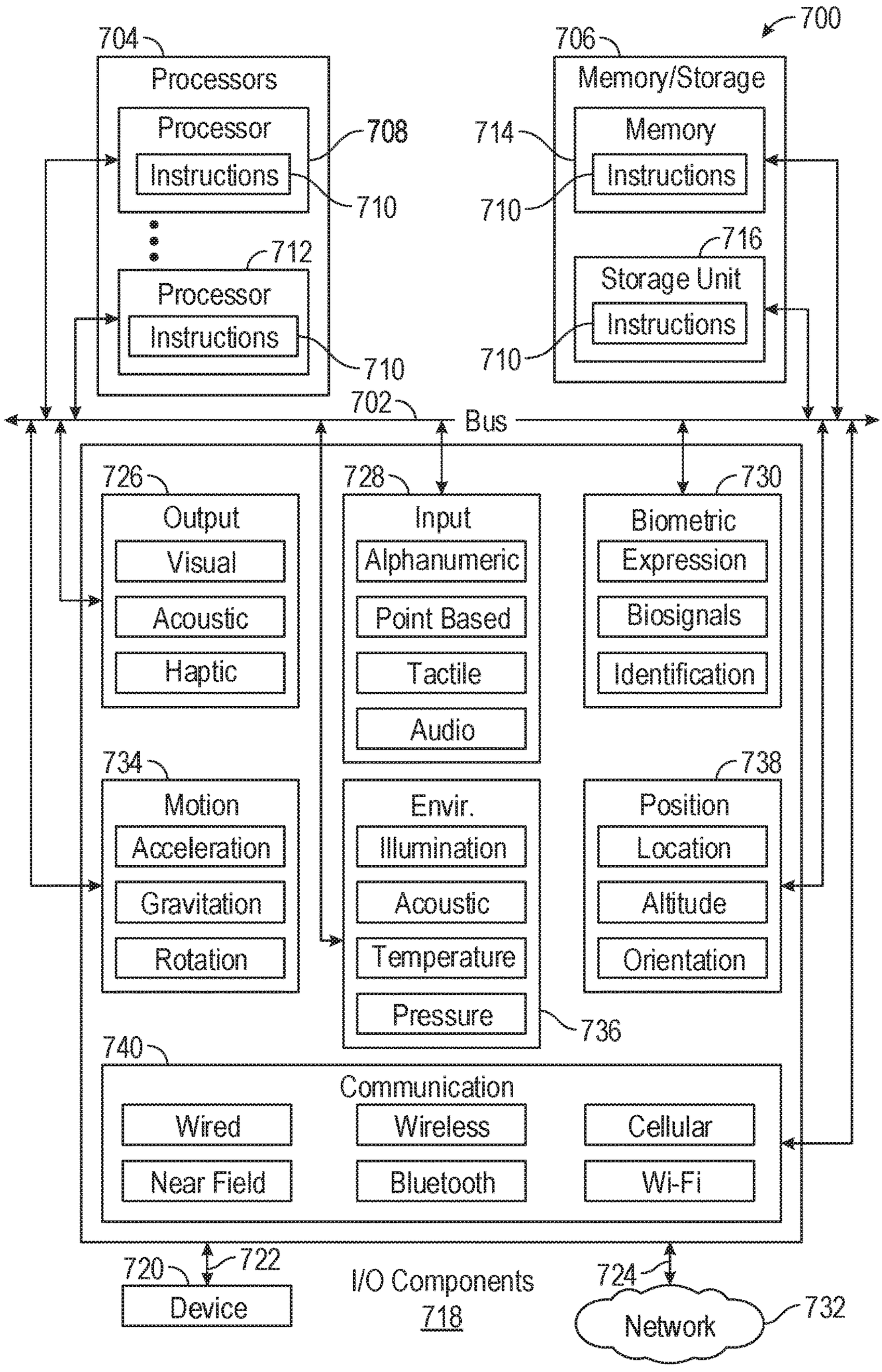
700
704
Processors
Processor
Instructions
708
710
712
Processor
Instructions
710
706
Memory/Storage
714
Memory
Instructions
710
716
Storage Unit
Instructions
710
702
Bus
726
Output
Visual
Acoustic
Haptic
728
Input
Alphanumeric
Point Based
Tactile
Audio
730
Biometric
Expression
Biosignals
Identification
734
Motion
Acceleration
Gravitation
Rotation
Envir.
Illumination
Acoustic
Temperature
Pressure
736
738
Position
Location
Altitude
Orientation
740
Communication
Wired
Wireless
Cellular
Near Field
Bluetooth
Wi-Fi
720
722
Device
I/O Components
718
724
Network
732

FIG. 7

CUSTOMIZED DIGITAL AVATAR ACCESSORIES

PRIORITY

This patent application claims the benefit of priority to U.S. Provisional Patent Application Ser. No. 62/449,432, filed on Jan. 23, 2017, which is hereby incorporated by reference herein in its entirety.

BACKGROUND

The popularity of electronic messaging, particularly instant messaging, continues to grow. Users increasingly use "emoji" (which are ideograms and icons) within electronic messages such as texts and emails, reflecting a global demand to communicate more visually. However, conventional emoji and similar graphics are typically generic and lacking in diversity: every individual user is represented by the same set of faces, irrespective of appearance, gender or ethnicity. Furthermore, every conversation that uses conventional emoji looks identical, and there is no visual personality or cue to identify the participants or distinguish one interaction from the next. Embodiments of the present disclosure address these and other issues.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, which are not necessarily drawn to scale, like numerals may describe similar components in different views. Like numerals having different letter suffixes may represent different instances of similar components. Some embodiments are illustrated by way of example, and not limitation, in the figures of the accompanying drawings in which:

FIG. **1** is a block diagram showing an example messaging system for exchanging data (e.g., messages and associated content) over a network.

FIG. **2** is block diagram illustrating further details regarding a messaging system, according to exemplary embodiments.

FIG. **3** is a schematic diagram illustrating data which may be stored in the database of the messaging server system, according to various exemplary embodiments.

FIG. **4** is a flow diagram of an exemplary process according to various aspects of the disclosure.

FIGS. **5**A-**5**N are screenshots illustrating the aspects of the method described in FIG. **4**.

FIG. **6** is a block diagram illustrating a representative software architecture, which may be used in conjunction with various hardware architectures herein described.

FIG. **7** is a block diagram illustrating components of a machine, according to some exemplary embodiments, able to read instructions from a machine-readable medium (e.g., a machine-readable storage medium) and perform any one or more of the methodologies discussed herein.

DETAILED DESCRIPTION

The description that follows includes systems, methods, techniques, instruction sequences, and computing machine program products that embody illustrative embodiments of the disclosure. In the following description, for the purposes of explanation, numerous specific details are set forth in order to provide an understanding of various embodiments of the inventive subject matter. It will be evident, however, to those skilled in the art, that embodiments of the inventive

subject matter may be practiced without these specific details. In general, well-known instruction instances, protocols, structures, and techniques are not necessarily shown in detail.

Among other things, embodiments of the present disclosure improve the functionality of electronic messaging software and systems by generating customized images with avatars of different users within electronic messages. For example, users of different mobile computing devices can exchange electronic communications with images generated to include avatars representing themselves as well as their friends, colleagues, and other acquaintances.

In some embodiments, images may be generated that contain avatars of users who exchange electronic communications, such as SMS or MMS texts and emails. Such images may be automatically generated based on the history of communications between users, the users' locations, and events the users are engaged in. The appearance of users' avatars may likewise be modified based on location and event information.

FIG. **1** is a block diagram showing an example of a messaging system **100** for exchanging data (e.g., messages and associated content) over a network. The messaging system **100** includes multiple client devices **102**, each of which hosts a number of applications including a messaging client application **104**. Each messaging client application **104** is communicatively coupled to other instances of the messaging client application **104** and a messaging server system **108** via a network **106** (e.g., the Internet). As used herein, the term "client device" may refer to any machine that interfaces to a communications network (such as network **106**) to obtain resources from one or more server systems or other client devices. A client device may be, but is not limited to, a mobile phone, desktop computer, laptop, portable digital assistants (PDAs), smart phones, tablets, ultra books, netbooks, laptops, multi-processor systems, microprocessor-based or programmable consumer electronics, game consoles, set-top boxes, or any other communication device that a user may use to access a network.

In the example shown in FIG. **1**, each messaging client application **104** is able to communicate and exchange data with another messaging client application **104** and with the messaging server system **108** via the network **106**. The data exchanged between messaging client applications **104**, and between a messaging client application **104** and the messaging server system **108**, includes functions (e.g., commands to invoke functions) as well as payload data (e.g., text, audio, video or other multimedia data).

The network **106** may include, or operate in conjunction with, an ad hoc network, an intranet, an extranet, a virtual private network (VPN), a local area network (LAN), a wireless LAN (WLAN), a wide area network (WAN), a wireless WAN (WWAN), a metropolitan area network (MAN), the Internet, a portion of the Internet, a portion of the Public Switched Telephone Network (PSTN), a plain old telephone service (POTS) network, a cellular telephone network, a wireless network, a Wi-Fi® network, another type of network, or a combination of two or more such networks. For example, a network or a portion of a network may include a wireless or cellular network and the coupling may be a Code Division Multiple Access (CDMA) connection, a Global System for Mobile communications (GSM) connection, or other type of cellular or wireless coupling. In this example, the coupling may implement any of a variety of types of data transfer technology, such as Single Carrier Radio Transmission Technology (1×RTT), Evolution-Data Optimized (EVDO) technology, General Packet Radio Ser-

vice (GPRS) technology, Enhanced Data rates for GSM Evolution (EDGE) technology, third Generation Partnership Project (3GPP) including 3G, fourth generation wireless (4G) networks, Universal Mobile Telecommunications System (UMTS). High Speed Packet Access (HSPA), Worldwide Interoperability for Microwave Access (WiMAX). Long Term Evolution (LTE) standard, others defined by various standard setting organizations, other long range protocols, or other data transfer technology.

The messaging server system **108** provides server-side functionality via the network **106** to a particular messaging client application **104**. While certain functions of the messaging system **100** are described herein as being performed by either a messaging client application **104** or by the messaging server system **108**, it will be appreciated that the location of certain functionality either within the messaging client application **104** or the messaging server system **108** is a design choice. For example, it may be technically preferable to initially deploy certain technology and functionality within the messaging server system **108**, but to later migrate this technology and functionality to the messaging client application **104** where a client device **102** has a sufficient processing capacity.

The messaging server system **108** supports various services and operations that are provided to the messaging client application **104**. Such operations include transmitting data to, receiving data from, and processing data generated by the messaging client application **104**. This data may include, message content, client device information, geolocation information, media annotation and overlays, message content persistence conditions, social network information, and live event information, as examples. Data exchanges within the messaging system **100** are invoked and controlled through functions available via user interfaces (UIs) of the messaging client application **104**.

Turning now specifically to the messaging server system **108**, an Application Program Interface (API) server **110** is coupled to, and provides a programmatic interface to, an application server **112**. The application server **112** is communicatively coupled to a database server **118**, which facilitates access to a database **120** in which is stored data associated with messages processed by the application server **112**.

Dealing specifically with the Application Program Interface (API) server **110**, this server receives and transmits message data (e.g., commands and message payloads) between the client device **102** and the application server **112**. Specifically, the Application Program Interface (API) server **110** provides a set of interfaces (e.g., routines and protocols) that can be called or queried by the messaging client application **104** in order to invoke functionality of the application server **112**. The Application Program Interface (API) server **110** exposes various functions supported by the application server **112**, including account registration, login functionality, the sending of messages, via the application server **112**, from a particular messaging client application **104** to another messaging client application **104**, the sending of electronic media files (e.g., electronic images or video) from a messaging client application **104** to the messaging server application **114**, and for possible access by another messaging client application **104**, the setting of a collection of media data (e.g., story), the retrieval of a list of friends of a user of a client device **102**, the retrieval of such collections, the retrieval of messages and content, the adding and deletion of friends to a social graph, the location of friends within a social graph, opening and application event (e.g., relating to the messaging client application **104**).

The application server **112** hosts a number of applications and subsystems, including a messaging server application **114**, an image processing system **116** and a social network system **122**. The messaging server application **114** implements a number of message processing technologies and functions, particularly related to the aggregation and other processing of content (e.g., textual and multimedia content including images and video clips) included in messages received from multiple instances of the messaging client application **104**. As will be described in further detail, the text and media content from multiple sources may be aggregated into collections of content (e.g., called stories or galleries). These collections are then made available, by the messaging server application **114**, to the messaging client application **104**. Other processor and memory intensive processing of data may also be performed server-side by the messaging server application **114**, in view of the hardware requirements for such processing.

The application server **112** also includes an image processing system **116** that is dedicated to performing various image processing operations, typically with respect to electronic images or video received within the payload of a message at the messaging server application **114**.

The social network system **122** supports various social networking functions services, and makes these functions and services available to the messaging server application **114**. To this end, the social network system **122** maintains and accesses an entity graph **304** within the database **120**. Examples of functions and services supported by the social network system **122** include the identification of other users of the messaging system **100** with which a particular user has relationships or is "following", and also the identification of other entities and interests of a particular user.

The application server **112** is communicatively coupled to a database server **118**, which facilitates access to a database **120** in which is stored data associated with messages processed by the messaging server application **114**.

Some embodiments may include one or more wearable devices, such as a pendant with an integrated camera that is integrated with, in communication with, or coupled to, a client device **102**. Any desired wearable device may be used in conjunction with the embodiments of the present disclosure, such as a watch, eyeglasses, goggles, a headset, a wristband, earbuds, clothing (such as a hat or jacket with integrated electronics), a clip-on electronic device, or any other wearable devices.

FIG. **2** is block diagram illustrating further details regarding the messaging system **100**, according to exemplary embodiments. Specifically, the messaging system **100** is shown to comprise the messaging client application **104** and the application server **112**, which in turn embody a number of some subsystems, namely an ephemeral timer system **202**, a collection management system **204** and an annotation system **206**.

The ephemeral timer system **202** is responsible for enforcing the temporary access to content permitted by the messaging client application **104** and the messaging server application **114**. To this end, the ephemeral timer system **202** incorporates a number of timers that, based on duration and display parameters associated with a message, or collection of messages (e.g., a story), selectively display and enable access to messages and associated content via the messaging client application **104**.

The collection management system **204** is responsible for managing collections of media (e.g., collections of text, image, video and audio data). In some examples, a collection of content (e.g., messages, including images, video, text, and

audio) may be organized into an "event gallery" or an "event story." Such a collection may be made available for a specified time period, such as the duration of an event to which the content relates. For example, content relating to a music concert may be made available as a "story" for the duration of that music concert. The collection management system **204** may also be responsible for publishing an icon that provides notification of the existence of a particular collection to the user interface of the messaging client application **104**.

The collection management system **204** furthermore includes a curation interface **208** that allows a collection manager to manage and curate a particular collection of content. For example, the curation interface **208** enables an event organizer to curate a collection of content relating to a specific event (e.g., delete inappropriate content or redundant messages). Additionally, the collection management system **204** employs machine vision (or image recognition technology) and content rules to automatically curate a content collection. In certain embodiments, compensation may be paid to a user for inclusion of user generated content into a collection. In such cases, the curation interface **208** operates to automatically make payments to such users for the use of their content.

The annotation system **206** provides various functions that enable a user to annotate or otherwise modify or edit media content associated with a message. For example, the annotation system **206** provides functions related to the generation and publishing of media overlays for messages processed by the messaging system **100**. The annotation system **206** operatively supplies a media overlay (e.g., a filter) to the messaging client application **104** based on a geolocation of the client device **102**. In another example, the annotation system **206** operatively supplies a media overlay to the messaging client application **104** based on other information, such as, social network information of the user of the client device **102**. A media overlay may include audio and visual content and visual effects. Examples of audio and visual content include pictures, texts, logos, animations, and sound effects. An example of a visual effect includes color overlaying. The audio and visual content or the visual effects can be applied to a media content item (e.g., an image or video) at the client device **102**. For example, the media overlay including text that can be overlaid on top of a photograph/electronic image generated by the client device **102**. In another example, the media overlay includes an identification of a location overlay (e.g., Venice beach), a name of a live event, or a name of a merchant overlay (e.g., Beach Coffee House). In another example, the annotation system **206** uses the geolocation of the client device **102** to identify a media overlay that includes the name of a merchant at the geolocation of the client device **102**. The media overlay may include other indicia associated with the merchant. The media overlays may be stored in the database **120** and accessed through the database server **118**.

In some exemplary embodiments, as discussed in more detail below, embodiments of the present disclosure may generate, display, distribute, and apply media overlays to media content items. For example, embodiments may utilize media content items generated by a client device **102** (e.g., an image or video captured using a digital camera coupled to the client device **102**) to generate media overlays that can be applied to other media content items.

FIG. **3** is a schematic diagram **300** illustrating data **300** that is stored in the database **120** of the messaging server system **108**, according to certain exemplary embodiments. While the content of the database **120** is shown to comprise a number of tables, the data could be stored in other types of data structures (e.g., as an object-oriented database).

The database **120** includes message data stored within a message table **314**. The entity table **302** stores entity data, including an entity graph **304**. Entities for which records are maintained within the entity table **302** may include individuals, corporate entities, organizations, objects, places, events etc. Regardless of type, any entity regarding which the messaging server system **108** stores data may be a recognized entity. Each entity is provided with a unique identifier, as well as an entity type identifier (not shown).

The entity graph **304** furthermore stores information regarding relationships and associations between entities. Such relationships may be social, professional (e.g., work at a common corporation or organization) interested-based or activity-based, merely for example.

The database **120** also stores annotation data, in the example form of filters, in an annotation table **312**. Filters for which data is stored within the annotation table **312** are associated with and applied to videos (for which data is stored in a video table **310**) or images (for which data is stored in an image table **308**). Filters, in one example, are overlays that are displayed as overlaid on an image or video during presentation to a recipient user. Filters may be of varies types, including a user-selected filters from a gallery of filters presented to a sending user by the messaging client application **104** when the sending user is composing a message.

Other types of filters include geolocation filters (also known as Geofilters) which may be presented to a sending user based on geographic location. For example, geolocation filters specific to a neighborhood or special location may be presented within a user interface by the messaging client application **104**, based on geolocation information determined by a GPS unit of the client device **102**. Another type of filter is a data filter, which may be selectively presented to a sending user by the messaging client application **104**, based on other inputs or information gathered by the client device **102** during the message creation process. Example of data filters include current temperature at a specific location, a current speed at which a sending user is traveling, battery life for a client device **102** or the current time. Other annotation data that may be stored within the image table **308** is so-called "Lens" data. A "Lens" may be a real-time special effect and sound that may be added to an image or a video.

As mentioned above, the video table **310** stores video data which, in one embodiment, is associated with messages for which records are maintained within the message table **314**. Similarly, the image table **308** stores image data associated with messages for which message data is stored in the entity table **302**. The entity table **302** may associate various annotations from the annotation table **312** with various images and videos stored in the image table **308** and the video table **310**.

A story table **306** stores data regarding collections of messages and associated image, video or audio data, which are compiled into a collection (e.g., a story or a gallery). The creation of a particular collection may be initiated by a particular user (e.g., each user for which a record is maintained in the entity table **302**). A user may create a "personal story" in the form of a collection of content that has been created and sent/broadcast by that user. To this end, the user interface of the messaging client application **104** may include an icon that is user selectable to enable a sending user to add specific content to his or her personal story.

A collection may also constitute a "live story," which is a collection of content from multiple users that is created manually, automatically or using a combination of manual and automatic techniques. For example, a "live story" may constitute a curated stream of user-submitted content from varies locations and events. Users, whose client devices have location services enabled and are at a common location event at a particular time may, for example, be presented with an option, via a user interface of the messaging client application **104**, to contribute content to a particular live story. The live story may be identified to the user by the messaging client application **104**, based on his or her location. The end result is a "live story" told from a community perspective.

A further type of content collection is known as a "location story," which enables a user whose client device **102** is located within a specific geographic location (e.g., on a college or university campus) to contribute to a particular collection. In some embodiments, a contribution to a location story may require a second degree of authentication to verify that the end user belongs to a specific organization or other entity (e.g., is a student on the university campus).

Embodiments of the present disclosure may generate and present customized images for use within electronic messages/communications such as short message service (SMS) or multimedia message service (MMS) texts and emails. The customized images may also be utilized in conjunction with the stories, filters, and ephemeral messaging functionality discussed herein.

Additionally, people often change what they're wearing based on a variety of factors like mood, environment, trends, time of day, weather, and other considerations. Some embodiments may allow a user to browse through a gallery or list of avatar outfits and other accessories to generate a particular appearance for the user's avatar. In other embodiments, the system may automatically change the appearance of an avatar by modifying the accessories of the avatar based on a variety of real-world and data driven factors. Such factors may include, for example, modifying an avatar's appearance based on one or more of: location, velocity, altitude, weather, time of day, mood/sentiment of previous messages involving the user, trends/popularity, past purchases, and other factors. Among other things, embodiments of the present disclosure can help make users' avatars more relevant to the user, assist in frictionless sharing between users involving their avatars, and a help the user to form a tighter bond with his or her avatar.

FIG. **4** depicts an exemplary process according to various aspects of the present disclosure. In this example, method **400** includes retrieving communication data regarding communications between one or more users (**405**), determining a relationship between the users based on the communication data (**410**), generating avatar characteristics based on the relationship (**415**), generating an image containing avatars representing the users based on the avatar characteristics (**420**), displaying the image on a display (**425**), and transmitting an electronic communication containing the image (**430**). Method **400** further includes receiving an electronic communication containing an image (**435**), analyzing the received image (**440**), generating a response image based on the analysis (**445**), presenting the response image to a user receiving the electronic communication (**450**), preparing an electronic communication containing the response image (**455**), generating an event story based on communications between users (**460**), and providing temporary access to the event story (**465**). The steps of method **400** may be performed in whole or in part, may be performed in conjunction with some or all of the steps in other methods, and may be performed by any number of different systems, such as the systems described in FIGS. **1** and/or **7**.

Embodiments of the present disclosure can retrieve (**405**) a variety of communication data from a variety of sources. For example, communication data may be retrieved from the memory of a computing device (such as client computing device **102** in FIG. **1**) performing some or all of the functionality of method **400**. Alternately or additionally, communication data may be retrieved from another computing device (e.g., over a network). Communication data may include a history of electronic communications (such as emails, text messages, and the like) between a plurality of users. For example, consider two users, a first user and a second user, who exchange a series of text messages with each other using their respective mobile computing devices (e.g., client computing devices **102** in FIG. **1**). The computing device of the first user may be adapted to store the messages in its memory for later retrieval, or to request the messages (or information regarding them) from another source (such as application server **112** in FIG. **1**).

The communication data may include meta data associated with one or more communications, such as the size of the communication, the date/time it was sent, one or more languages used in the communication, identifiers for the sender and/or recipient(s), information regarding the computing devices (e.g. the mobile devices of the sender or recipient or a messaging server) involved in transmitting or receiving the communication, and other information. In the case of identification information, any such identifier may be used, such as the user's full name or a username associated with the user. The user identifier may also be an identifier associated with the user's computing device, such as a Unique Device Identifier (UDID) or Identifier for Advertising (IDFA). The communication data may also include text, images, video, and other content within a communication. For example, the communication data may include terms used by users within one or more communications to address each other, such as "hi mom," "hey buddy." "how's my favorite nephew," and the like. Such terms (and other communication data) may be used to help identify a relationship between users based on their communications with each other as discussed below.

The system may request authorization from a user to analyze communication data associated with the user's communications. The authorization request may be presented to the user via the user's computing device and may allow the user to select the types of communication data the system may analyze as well as allowing the user to entirely disable the system from analyzing the user's communication data altogether. In cases where the user grants the system access to analyze the user's communication data, the system can analyze the communication data to automatically determine (**410**) a relationship between the user and other users with whom the user communicates.

Embodiments of the present disclosure can identify any number of different relationships between any number of users. Examples of such relationships may include family relationships, friendships, or romantic relationships, as well as others. Embodiments of the disclosure may also identify other aspects of relationships between users, such as whether the users are work colleagues, classmates, roommates, and/or acquaintances. Analysis of communication data to identify relationships between users may also be supplemented with other information, such as data retrieved from social

networking sites, as well as direct input from the user providing information on his/her relationships with various users.

Based on the relationship between different users, the system can generate characteristics for avatars (**415**) that represent the different users and use such avatar characteristics to generate images (**420**) containing the avatars of the users. As used herein, an "avatar" of a user is any visual representation of user. The avatar of a user may be based on images of the user in conjunction with the avatar characteristics identified from the user's relationships with other users. Alternatively or additionally, the user may select and customize characteristics of the user's avatar via the user's computing device. Such characteristics may include, for example, the user's bodily features (e.g., muscular, thin, etc.), facial features, clothing and other accessories, text displayed in conjunction with the avatar, and images displayed in conjunction with the avatar. Embodiments of the present disclosure may generate (**420**) images containing any number of avatars.

FIGS. **5**A-**5**N illustrate exemplary screenshot images illustrating various aspects of the present disclosure. Such images may be displayed (**425**) on the display screen of one or more computing devices, such as in a menu of image options to include within an electronic communication to another user, or within electronic communication itself. Images generated by embodiments of the present disclosure may include any number of user avatars in a variety of forms as described in more detail below.

In some embodiments, the generation of images containing avatars may be performed in conjunction with displaying the avatars within a video game. In some cases, the images may be displayed in a single-person game (e.g., played alone by a first user on the first user's computing device) or in a multi-player game (e.g., the game is accessed by the computing device of a first user and the computing device of a second user) played over a network or other connection. During the game, various events may occur and the avatars of one or more users may be modified as a result. For example, an avatar who experiences an injury may be depicted with a black eye, while an avatar who finds an item in the game (e.g., a sword) can be modified to show the avatar carrying the item. In this manner, embodiments of the disclosure allow users to have their own customized avatars (which may be based on their own likenesses) appear in video games as well as in other contexts, such as text messages or other electronic communications.

Generation of the images containing user avatars may be based on an event. The event may affect one user (such as the user's birthday) or be common to multiple users. Generation of the images containing user avatars may be based on the locations of different users. For example, embodiments of the present disclosure may retrieve location information from the computing devices of two different users. In embodiments where a client computing device (such as client device **102**) is performing the image generation, location information for the device can be retrieved from the device's global positioning system and location information for the device of another can be requested over a network.

The avatars of different users in different locations can be generated to reflect their respective locations. For example, the avatar of a first user whose mobile computing device indicates is in the tropics could be depicted standing in a bathing suit on a beach, while the avatar of a second user whose mobile device indicates is in an area with snow could be depicted wearing a jacket and shivering. Accordingly, the location information from a device associated with a user can be combined with information regarding the location and/or an event occurring at the location to generate the avatar and/or image. Such location-based information may include weather information, time of day, local customs (such as language and/or dress), and other information.

In some cases, the system can identify that two or more users are in a common location. In this context, a "common location" may be identified as being within any predetermined boundary, such as within the same building, the same city, the same two-block radius, the same state, etc. In such cases, the image can be generated to depict the avatars of multiple users based on the common location. As described above, the image containing multiple avatars may be generated based on information regarding the location as well as identifying an event taking place at the common location. Such events may include, for example, a sporting event, a business meeting, an educational event, a pre-arranged meeting between the user and another person (such as a lunch meeting), and other events.

In some embodiments, the system may modify various features of an avatar, as well as features of an image containing an avatar, based on location information and/or event information. The system can modify avatars and images based on identified events and locations in any suitable manner. For example, avatars of users attending the same sporting event could be depicted in an image wearing the jersey of one of the teams playing at the event. Users attending a paintball event together could result in an image being generated showing avatars of the users holding paint-guns and covered in paint. Users attending a mud obstacle race could result in an image being generated showing avatars of the users covered in mud. Furthermore, information from users' electronic communications between each other and/or social network posts can be used to identify an event attended by the user and use such information to generate avatar attributes and images.

FIGS. **5**A-**5**C illustrate one exemplary usage of an embodiment of the present disclosure. In this example, a user of a computing device operating in conjunction with embodiments of the disclosure buys tickets to go to a Toronto Raptors basketball game. Once seated, the user captures an image of the warmup (FIG. **5**A) using the digital camera on the user's smartphone to share what the user is doing with the user's friends. The system uses the GPS coordinates of the user's smartphone to determine that the user is at the Air Canada Centre (where the Raptors play). Based on this information alone, the system could generate and display series of outfits for the user's avatar associated with the location (such as Raptors-related outfits). Additionally in this example, the system determines that its 7:00 pm and, based on information collected via the Internet, further determines that a Raptors basketball game will be starting soon. Based on these additional determinations, the system could generate and display avatar outfits associated with the jerseys of the home and away teams. Finally in this example, the system may analyze user information associated with the user to determine that the user lives in Toronto and (based on the user's previous text messages, emails, social media posts, and the like) that the user is a Raptors fan, and therefore displays the user's avatar in the home team's (Raptor's) jersey as shown in FIG. **5**B. The gallery in FIG. **5**B includes a plurality of images that (in this example) are overlay "stickers" that can be applied to images the user captures via the camera coupled to the user's mobile computing device. FIG. **5**C displays the image captured by the user in FIG. **5**A after the user attaches a sticker of the user's

avatar in his Raptors gear. The user may subsequently share the modified image with his friend (e.g., via the user's story).

In some exemplary embodiments, the system can identify users at a common location, generate images containing the avatars of such users, and initiate (automatically or in response to user activation) the transmission of electronic communications to such users. For example, if a first user and second user attend an event (such as a baseball game at a stadium) together, the system (e.g., via the first user's mobile computing device) may (e.g., automatically with the first user's authorization or in response to the first user's instruction) search for other users in the contact list of the first user's mobile device who are also at the stadium. In response to identifying a third user, the system may then generate an image containing avatars representing the first, second, and third users (e.g., all wearing team jerseys) and transmit an electronic message/communication containing the image to a mobile computing device carried by the third user (e.g., in a text message). Among other things, this can help users quickly identify and reach out to people they know at various events and locations.

Embodiments of the present disclosure may transmit (**430**) and/or receive (**435**) electronic communications containing images with avatars. Any form of electronic communication may be utilized by embodiments of the present disclosure, such as SMS texts, MMS texts, emails, and other communications. Images included in such communications may be provided as attachments, displayed inline in the message, or conveyed in any other suitable manner.

In some embodiments, the system may generate a plurality of images containing one or more avatars and allow a user of the system to select which image(s) he/she wishes to include in an electronic communication. In some embodiments, the generation of such images may be based on the content of communications sent or received by the system, as well as on other communication data as discussed above. In one particular embodiment, a computing device operated by a first user receives (**435**) an electronic communication from the computing device of a second user, where the communication contains an image that includes avatars representing the first and second user. In this example, the computing device of the first user is adapted to analyze the image in order to identify its content, then generate (**445**) one or more response images and present (**450**) the response image(s) to the first user (e.g., via the display screen of the user's computing device) for selection by the user. The selected image(s) are then included in an electronic communication (**455**) that can be transmitted to the computing device of the second user.

Embodiments of the present disclosure can identify a variety of content in the received image and generate response images accordingly. As with other images described above, the response image may further be generated based on other information, such as the text content of communications between the first and second user, the history of communications between the users, and information from sources outside the communications, such as data gathered from social network sites. In this manner, the system can not only generate initial images that are pertinent and useful to users in communicating with others, but can generate response images that are contextually congruent to the communications between different users

As described in more detail above, embodiments of the disclosure may generate an event story or event gallery (**460**) based on a collection or series of electronic communications between users and provide temporary access to the event story or gallery (**465**). Any collection of such communications may be selected based on any criteria, and one or more users may be granted access to an event story or gallery for any desired predetermined period of time. Likewise, the system may grant access to images generated by the system or received from other system for a predetermined period of time as described above. Such images may also be presented in conjunction with a media overlay (e.g., a filter).

A variety of media content items may be generated (**445**) and displayed (**450**) in conjunction with embodiments of the present disclosure. In this context, a "media content item" may include any type of electronic media in any format. For example, a media content item may include an image in JPG format, an image in PNG format, a video in FLV format, a video in AVI format, etc. In some exemplary embodiments, a media content item may include content that is captured using an image capture device or component (such as a digital camera) coupled to, or in communication with, a system performing the functionality of method **400**. In the exemplary system **700** depicted in FIG. **7** may include a digital camera as one of input components **728**. Additionally or alternatively, the media content item may be received from another system or device. In FIG. **1**, for example, a client device **102** performing the functionality of method **400** may receive a media content item from another client device **102** or other system via network **106**.

In some embodiments, the media content item generated (**445**) by the system may be included in a media overlay such as a "sticker" (i.e., an image that can be overlaid onto other images), filter (discussed above), or another media overlay. Such overlays may include static (i.e., non-moving) features as well as dynamic (i.e., moving) features.

Generation of the media content item (**445**) may include the generation of one or more data structure fields containing information regarding the content item. For example, the system may generate a name field in a data structure for the media overlay that includes a name for the media content item received from the content provider.

Embodiments of the present disclosure may transmit and receive electronic communications containing media content items, media overlays, or other content any form of electronic communication, such as SMS texts, MMS texts, emails, and other communications. Media content items included in such communications may be provided as attachments, displayed inline in the message, within media overlays, or conveyed in any other suitable manner.

The screenshots in FIGS. **5**D-**5**I illustrate another example using embodiments of the present disclosure. In this example, a user arrives at the airport, checks in for a flight, and opens a group chat via the user's mobile computing device (e.g., smartphone) titled "Vegas Trip" (FIG. **5**D). The system uses GPS coordinates from the user's mobile computing device to determine that he's at an airport, and in response to the user's location and title of the user's group chat generates and displays a gallery of avatar stickers at the bottom of the user's screen (FIG. **5**E), including the user's avatar in a pilot hat and goggles, as well as stickers related to travel and gambling.

In FIG. **5**F the user selects the "Ready for Takeoff!" and shares the sticker in the group chat. Subsequently, the user boards his plane and takes off. During the flight, the user captures an image out the window (FIG. **5**G). The system utilizes altitude and velocity information from the user's mobile computing device (e.g., received via input component sensors **728**, described in more detail with reference to FIG. **7** below) and determines that the user is currently flying, and generates and displays a gallery of images

(stickers in this example) of the user's avatar wearing a parachute, along with other flight and travel-related stickers (FIG. **5**H). In FIG. **5**I, the user selects and applies the "Let's Do This!" sticker to the image the user captured in FIG. **5**G. The user could subsequently share this modified image (with the sticker applied) with others in the "Vegas Trip" group chat or with other users (e.g., via text or email).

Embodiments of the present disclosure may further be used in conjunction to display various products purchased by or shopped for by the user in conjunction with the user's avatar. FIGS. **5**J-**5**N illustrate another example where the user walks into a store and captures an image of himself trying on a sweater (FIG. **5**J) using the camera on the user's mobile computing device. The system applies an image recognition process to the image in FIG. **5**J to identify the sweater, and to generate and display a set of images (FIG. **5**K) with the user's avatar wearing the sweater. In FIG. **5**L, the user has selected and attached the "Yes or No?" sticker to the image from FIG. **5**J. Subsequently, the user sends the image in FIG. **5**J to the user's friend via an electronic communication, the user's friend replies positively, and the user buys the sweater. When the user gets home, the user notices a physical tag attached to the sweater (e.g., containing a barcode) which the user scans with the camera of his mobile computing device. FIG. **5**M illustrates an exemplary tag (the tag with the square smiling face) that may be used in conjunction with embodiments of the present disclosure. In response to scanning the tag, the system utilizes location information from the user's mobile device to present outfits and content to the user for a limited period of time while the user is within a predetermined area (e.g., within 1 mile of the store where the user purchased the sweater). Additionally, the system may generate and display an animation showing the user's avatar wearing the same sweater the user just purchased. The animation and images of the user's avatar in the sweater may be made available to the user for a predetermined period of time or permanently added to the user's gallery.

Software Architecture

FIG. **6** is a block diagram illustrating an exemplary software architecture **606**, which may be used in conjunction with various hardware architectures herein described. FIG. **6** is a non-limiting example of a software architecture and it will be appreciated that many other architectures may be implemented to facilitate the functionality described herein. The software architecture **606** may execute on hardware such as machine **700** of FIG. **7** that includes, among other things, processors **704**, memory **714**, and I/O components **718**. A representative hardware layer **652** is illustrated and can represent, for example, the machine **700** of FIG. **7**. The representative hardware layer **652** includes a processing unit **654** having associated executable instructions **604**. Executable instructions **604** represent the executable instructions of the software architecture **606**, including implementation of the methods, components and so forth described herein. The hardware layer **652** also includes memory or storage modules memory/storage **656**, which also have executable instructions **604**. The hardware layer **652** may also comprise other hardware **658**.

As used herein, the term "component" may refer to a device, physical entity or logic having boundaries defined by function or subroutine calls, branch points, application program interfaces (APIs), or other technologies that provide for the partitioning or modularization of particular processing or control functions. Components may be combined via their interfaces with other components to carry out a machine process. A component may be a packaged functional hardware unit designed for use with other components and a part of a program that usually performs a particular function of related functions.

Components may constitute either software components (e.g., code embodied on a machine-readable medium) or hardware components. A "hardware component" is a tangible unit capable of performing certain operations and may be configured or arranged in a certain physical manner. In various exemplary embodiments, one or more computer systems (e.g., a standalone computer system, a client computer system, or a server computer system) or one or more hardware components of a computer system (e.g., a processor or a group of processors) may be configured by software (e.g., an application or application portion) as a hardware component that operates to perform certain operations as described herein. A hardware component may also be implemented mechanically, electronically, or any suitable combination thereof. For example, a hardware component may include dedicated circuitry or logic that is permanently configured to perform certain operations.

A hardware component may be a special-purpose processor, such as a Field-Programmable Gate Array (FPGA) or an Application Specific Integrated Circuit (ASIC). A hardware component may also include programmable logic or circuitry that is temporarily configured by software to perform certain operations. For example, a hardware component may include software executed by a general-purpose processor or other programmable processor. Once configured by such software, hardware components become specific machines (or specific components of a machine) uniquely tailored to perform the configured functions and are no longer general-purpose processors. It will be appreciated that the decision to implement a hardware component mechanically, in dedicated and permanently configured circuitry, or in temporarily configured circuitry (e.g., configured by software) may be driven by cost and time considerations.

A processor may be, or in include, any circuit or virtual circuit (a physical circuit emulated by logic executing on an actual processor) that manipulates data values according to control signals (e.g., "commands". "op codes". "machine code", etc.) and which produces corresponding output signals that are applied to operate a machine. A processor may, for example, be a Central Processing Unit (CPU), a Reduced Instruction Set Computing (RISC) processor, a Complex Instruction Set Computing (CISC) processor, a Graphics Processing Unit (GPU), a Digital Signal Processor (DSP), an Application Specific Integrated Circuit (ASIC), a Radio-Frequency Integrated Circuit (RFIC) or any combination thereof. A processor may further be a multi-core processor having two or more independent processors (sometimes referred to as "cores") that may execute instructions contemporaneously.

Accordingly, the phrase "hardware component" (or "hardware-implemented component") should be understood to encompass a tangible entity, be that an entity that is physically constructed, permanently configured (e.g., hardwired), or temporarily configured (e.g., programmed) to operate in a certain manner or to perform certain operations described herein. Considering embodiments in which hardware components are temporarily configured (e.g., programmed), each of the hardware components need not be configured or instantiated at any one instance in time. For example, where a hardware component comprises a general-purpose processor configured by software to become a special-purpose processor, the general-purpose processor may be configured as respectively different special-purpose processors (e.g., comprising different hardware components) at different

times. Software accordingly configures a particular processor or processors, for example, to constitute a particular hardware component at one instance of time and to constitute a different hardware component at a different instance of time. Hardware components can provide information to, and receive information from, other hardware components. Accordingly, the described hardware components may be regarded as being communicatively coupled. Where multiple hardware components exist contemporaneously, communications may be achieved through signal transmission (e.g., over appropriate circuits and buses) between or among two or more of the hardware components. In embodiments in which multiple hardware components are configured or instantiated at different times, communications between such hardware components may be achieved, for example, through the storage and retrieval of information in memory structures to which the multiple hardware components have access.

For example, one hardware component may perform an operation and store the output of that operation in a memory device to which it is communicatively coupled. A further hardware component may then, at a later time, access the memory device to retrieve and process the stored output. Hardware components may also initiate communications with input or output devices, and can operate on a resource (e.g., a collection of information). The various operations of example methods described herein may be performed, at least partially, by one or more processors that are temporarily configured (e.g., by software) or permanently configured to perform the relevant operations. Whether temporarily or permanently configured, such processors may constitute processor-implemented components that operate to perform one or more operations or functions described herein. As used herein. "processor-implemented component" refers to a hardware component implemented using one or more processors. Similarly, the methods described herein may be at least partially processor-implemented, with a particular processor or processors being an example of hardware. For example, at least some of the operations of a method may be performed by one or more processors or processor-implemented components.

Moreover, the one or more processors may also operate to support performance of the relevant operations in a "cloud computing" environment or as a "software as a service" (SaaS). For example, at least some of the operations may be performed by a group of computers (as examples of machines including processors), with these operations being accessible via a network (e.g., the Internet) and via one or more appropriate interfaces (e.g., an Application Program Interface (API)). The performance of certain of the operations may be distributed among the processors, not only residing within a single machine, but deployed across a number of machines. In some exemplary embodiments, the processors or processor-implemented components may be located in a single geographic location (e.g., within a home environment, an office environment, or a server farm). In other exemplary embodiments, the processors or processor-implemented components may be distributed across a number of geographic locations.

In the exemplary architecture of FIG. **6**, the software architecture **606** may be conceptualized as a stack of layers where each layer provides particular functionality. For example, the software architecture **606** may include layers such as an operating system **602**, libraries **620**, applications **616** and a presentation layer **614**. Operationally, the applications **616** or other components within the layers may invoke application programming interface (API) API calls **608** through the software stack and receive messages **612** in response to the API calls **608**. The layers illustrated are representative in nature and not all software architectures have all layers. For example, some mobile or special purpose operating systems may not provide a frameworks/middleware **618**, while others may provide such a layer. Other software architectures may include additional or different layers.

The operating system **602** may manage hardware resources and provide common services. The operating system **602** may include, for example, a kernel **622**, services **624** and drivers **626**. The kernel **622** may act as an abstraction layer between the hardware and the other software layers. For example, the kernel **622** may be responsible for memory management, processor management (e.g., scheduling), component management, networking, security settings, and so on. The services **624** may provide other common services for the other software layers. The drivers **626** are responsible for controlling or interfacing with the underlying hardware. For instance, the drivers **626** include display drivers, camera drivers. Bluetooth® drivers, flash memory drivers, serial communication drivers (e.g., Universal Serial Bus (USB) drivers), Wi-Fi® drivers, audio drivers, power management drivers, and so forth depending on the hardware configuration.

The libraries **620** provide a common infrastructure that is used by the applications **616** or other components or layers. The libraries **620** provide functionality that allows other software components to perform tasks in an easier fashion than to interface directly with the underlying operating system **602** functionality (e.g., kernel **622**, services **624** or drivers **626**). The libraries **620** may include system libraries **644** (e.g., C standard library) that may provide functions such as memory allocation functions, string manipulation functions, mathematical functions, and the like. In addition, the libraries **620** may include API libraries **646** such as media libraries (e.g., libraries to support presentation and manipulation of various media format such as MPREG4, H.264. MP3. AAC. AMR. JPG, PNG), graphics libraries (e.g., an OpenGL framework that may be used to render 2D and 3D in a graphic content on a display), database libraries (e.g., SQLite that may provide various relational database functions), web libraries (e.g., WebKit that may provide web browsing functionality), and the like. The libraries **620** may also include a wide variety of other libraries **648** to provide many other APIs to the applications **616** and other software components/modules.

The frameworks/middleware **618** (also sometimes referred to as middleware) provide a higher-level common infrastructure that may be used by the applications **616** or other software components/modules. For example, the frameworks/middleware **618** may provide various graphic user interface (GUI) functions, high-level resource management, high-level location services, and so forth. The frameworks/middleware **618** may provide a broad spectrum of other APIs that may be utilized by the applications **616** or other software components/modules, some of which may be specific to a particular operating system **602** or platform.

The applications **616** include built-in applications **638** or third-party applications **640**. Examples of representative built-in applications **638** may include, but are not limited to, a contacts application, a browser application, a book reader application, a location application, a media application, a messaging application, or a game application. Third-party applications **640** may include an application developed using the ANDROID™ or IOS™ software development kit (SDK) by an entity other than the vendor of the particular

platform, and may be mobile software running on a mobile operating system such as IOS™, ANDROID™, WINDOWS® Phone, or other mobile operating systems. The third-party applications **640** may invoke the API calls **608** provided by the mobile operating system (such as operating system **602**) to facilitate functionality described herein.

The applications **616** may use built in operating system functions (e.g., kernel **622**, services **624** or drivers **626**), libraries **620**, and frameworks/middleware **618** to create user interfaces to interact with users of the system. Alternatively, or additionally, in some systems interactions with a user may occur through a presentation layer, such as presentation layer **614**. In these systems, the application/component "logic" can be separated from the aspects of the application/component that interact with a user.

FIG. **7** is a block diagram illustrating components (also referred to herein as "modules") of a machine **700**, according to some exemplary embodiments, able to read instructions from a machine-readable medium (e.g., a machine-readable storage medium) and perform any one or more of the methodologies discussed herein. Specifically. FIG. **7** shows a diagrammatic representation of the machine **700** in the example form of a computer system, within which instructions **710** (e.g., software, a program, an application, an applet, an app, or other executable code) for causing the machine **700** to perform any one or more of the methodologies discussed herein may be executed. As such, the instructions **710** may be used to implement modules or components described herein. The instructions **710** transform the general, non-programmed machine **700** into a particular machine **700** programmed to carry out the described and illustrated functions in the manner described. In alternative embodiments, the machine **700** operates as a standalone device or may be coupled (e.g., networked) to other machines. In a networked deployment, the machine **700** may operate in the capacity of a server machine or a client machine in a server-client network environment, or as a peer machine in a peer-to-peer (or distributed) network environment. The machine **700** may comprise, but not be limited to, a server computer, a client computer, a personal computer (PC), a tablet computer, a laptop computer, a netbook, a set-top box (STB), a personal digital assistant (PDA), an entertainment media system, a cellular telephone, a smart phone, a mobile device, a wearable device (e.g., a smart watch), a smart home device (e.g., a smart appliance), other smart devices, a web appliance, a network router, a network switch, a network bridge, or any machine capable of executing the instructions **710**, sequentially or otherwise, that specify actions to be taken by machine **700**. Further, while only a single machine **700** is illustrated, the term "machine" shall also be taken to include a collection of machines that individually or jointly execute the instructions **710** to perform any one or more of the methodologies discussed herein.

The machine **700** may include processors **704**, memory memory/storage **706**, and I/O components **718**, which may be configured to communicate with each other such as via a bus **702**. The memory/storage **706** may include a memory **714**, such as a main memory, or other memory storage, and a storage unit **716**, both accessible to the processors **704** such as via the bus **702**. The storage unit **716** and memory **714** store the instructions **710** embodying any one or more of the methodologies or functions described herein. The instructions **710** may also reside, completely or partially, within the memory **714**, within the storage unit **716**, within at least one of the processors **704** (e.g., within the processor's cache memory), or any suitable combination thereof, during execution thereof by the machine **700**. Accordingly, the memory **714**, the storage unit **716**, and the memory of processors **704** are examples of machine-readable media.

As used herein, the term "machine-readable medium," "computer-readable medium," or the like may refer to any component, device or other tangible media able to store instructions and data temporarily or permanently. Examples of such media may include, but is not limited to, random-access memory (RAM), read-only memory (ROM), buffer memory, flash memory, optical media, magnetic media, cache memory, other types of storage (e.g., Erasable Programmable Read-Only Memory (EEPROM)) or any suitable combination thereof. The term "machine-readable medium" should be taken to include a single medium or multiple media (e.g., a centralized or distributed database, or associated caches and servers) able to store instructions. The term "machine-readable medium" may also be taken to include any medium, or combination of multiple media, that is capable of storing instructions (e.g., code) for execution by a machine, such that the instructions, when executed by one or more processors of the machine, cause the machine to perform any one or more of the methodologies described herein. Accordingly, a "machine-readable medium" may refer to a single storage apparatus or device, as well as "cloud-based" storage systems or storage networks that include multiple storage apparatus or devices. The term "machine-readable medium" excludes signals per se.

The I/O components **718** may include a wide variety of components to provide a user interface for receiving input, providing output, producing output, transmitting information, exchanging information, capturing measurements, and so on. The specific I/O components **718** that are included in the user interface of a particular machine **700** will depend on the type of machine. For example, portable machines such as mobile phones will likely include a touch input device or other such input mechanisms, while a headless server machine will likely not include such a touch input device. It will be appreciated that the I/O components **718** may include many other components that are not shown in FIG. **7**. The I/O components **718** are grouped according to functionality merely for simplifying the following discussion and the grouping is in no way limiting. In various exemplary embodiments, the I/O components **718** may include output components **726** and input components **728**. The output components **726** may include visual components (e.g., a display such as a plasma display panel (PDP), a light emitting diode (LED) display, a liquid crystal display (LCD), a projector, or a cathode ray tube (CRT)), acoustic components (e.g., speakers), haptic components (e.g., a vibratory motor, resistance mechanisms), other signal generators, and so forth. The input components **728** may include alphanumeric input components (e.g., a keyboard, a touch screen configured to receive alphanumeric input, a photo-optical keyboard, or other alphanumeric input components), point based input components (e.g., a mouse, a touchpad, a trackball, a joystick, a motion sensor, or other pointing instrument), tactile input components (e.g., a physical button, a touch screen that provides location or force of touches or touch gestures, or other tactile input components), audio input components (e.g., a microphone), and the like. The input components **728** may also include one or more image-capturing devices, such as a digital camera for generating digital images or video.

In further exemplary embodiments, the I/O components **718** may include biometric components **730**, motion components **734**, environmental environment components **736**, or position components **738**, as well as a wide array of other

components. One or more of such components (or portions thereof) may collectively be referred to herein as a "sensor component" or "sensor" for collecting various data related to the machine **700**, the environment of the machine **700**, a user of the machine **700**, or a combinations thereof.

For example, the biometric components **730** may include components to detect expressions (e.g., hand expressions, facial expressions, vocal expressions, body gestures, or eye tracking), measure biosignals (e.g., blood pressure, heart rate, body temperature, perspiration, or brain waves), identify a person (e.g., voice identification, retinal identification, facial identification, fingerprint identification, or electroencephalogram based identification), and the like. The motion components **734** may include acceleration sensor components (e.g., accelerometer), gravitation sensor components, velocity sensor components (e.g., speedometer), rotation sensor components (e.g., gyroscope), and so forth. The environment components **736** may include, for example, illumination sensor components (e.g., photometer), temperature sensor components (e.g., one or more thermometer that detect ambient temperature), humidity sensor components, pressure sensor components (e.g., barometer), acoustic sensor components (e.g., one or more microphones that detect background noise), proximity sensor components (e.g., infrared sensors that detect nearby objects), gas sensors (e.g., gas detection sensors to detection concentrations of hazardous gases for safety or to measure pollutants in the atmosphere), or other components that may provide indications, measurements, or signals corresponding to a surrounding physical environment. The position components **738** may include location sensor components (e.g., a Global Position system (GPS) receiver component), altitude sensor components (e.g., altimeters or barometers that detect air pressure from which altitude may be derived), orientation sensor components (e.g., magnetometers), and the like. For example, the location sensor component may provide location information associated with the system **700**, such as the system's **700** GPS coordinates or information regarding a location the system **700** is at currently (e.g., the name of a restaurant or other business).

Communication may be implemented using a wide variety of technologies. The I/O components **718** may include communication components **740** operable to couple the machine **700** to a network **732** or devices **720** via coupling **722** and coupling **724** respectively. For example, the communication components **740** may include a network interface component or other suitable device to interface with the network **732**. In further examples, communication components **740** may include wired communication components, wireless communication components, cellular communication components, Near Field Communication (NFC) components, Bluetooth® components (e.g., Bluetooth® Low Energy), Wi-Fi® components, and other communication components to provide communication via other modalities. The devices **720** may be another machine or any of a wide variety of peripheral devices (e.g., a peripheral device coupled via a Universal Serial Bus (USB)).

Moreover, the communication components **740** may detect identifiers or include components operable to detect identifiers. For example, the communication components **740** may include Radio Frequency Identification (RFID) tag reader components, NFC smart tag detection components, optical reader components (e.g., an optical sensor to detect one-dimensional bar codes such as Universal Product Code (UPC) bar code, multi-dimensional bar codes such as Quick Response (QR) code. Aztec code, Data Matrix, Dataglyph, MaxiCode. PDF417, Ultra Code, UCC RSS-2D bar code, and other optical codes), or acoustic detection components (e.g., microphones to identify tagged audio signals). In addition, a variety of information may be derived via the communication components **740**, such as, location via Internet Protocol (IP) geo-location, location via Wi-Fi® signal triangulation, location via detecting a NFC beacon signal that may indicate a particular location, and so forth.

Where a phrase similar to "at least one of A. B, or C," "at least one of A, B, and C," "one or more A, B, or C," or "one or more of A, B, and C" is used, it is intended that the phrase be interpreted to mean that A alone may be present in an embodiment, B alone may be present in an embodiment, C alone may be present in an embodiment, or that any combination of the elements A. B and C may be present in a single embodiment; for example. A and B. A and C, B and C, or A and B and C.

Changes and modifications may be made to the disclosed embodiments without departing from the scope of the present disclosure. These and other changes or modifications are intended to be included within the scope of the present disclosure, as expressed in the following claims.

What is claimed is:

1. A system comprising:

a processor;

a user interface coupled to the processor, the user interface comprising an input device and a display screen; and

memory coupled to the processor and storing instructions that, when executed by the processor, cause the processor to perform operations comprising:

identifying a real-world factor associated with a user, wherein identifying the real-world factor includes:

determining a geolocation associated with the user,

identifying a sporting event venue associated with the geolocation,

determining a first sports team and a second snorts team that are scheduled to appear at the sporting event venue within a threshold period from a current time,

determining a residence location of the user, and

determining that the first sports team is associated with the residence location of the user;

modifying a characteristic of an avatar associated with the user based on the real-world factor, wherein modifying the characteristic of the avatar includes modifying an avatar outfit worn by the avatar, wherein the avatar outfit is associated with the first sports team; and

causing the avatar to be displayed on the display screen of the user interface.

2. The system of claim **1**, wherein the real-world factor is at least one of:

a location, a velocity, an altitude, weather, time of day, mood or sentiment of previous messages associated with the user, trends or popularity, or a past purchase made by the user.

3. The system of claim **1**, wherein the memory further stores instructions for causing the processor to perform operations comprising modifying the characteristic of the avatar by modifying an avatar outfit or accessory worn by

the avatar, wherein the avatar outfit or accessory is associated with the real-world factor.

4. The system of claim **1**, wherein

determining the geolocation associated with the user is based on geolocation information from a mobile device of the user.

5. The system of claim **1**, wherein the memory further stores instructions for causing the processor to perform operations comprising identifying the real-world factor by:

determining the geolocation associated with the user and a movement information associated with the user based on a geolocation and movement information from a mobile device of the user; and

identifying a context associated with an electronic communication based on the geolocation and the movement information, wherein modifying the characteristic of the avatar comprises modifying an avatar outfit worn by the avatar, wherein the avatar outfit is associated with the geolocation and the context.

6. The system of claim **1**, wherein the memory further stores instructions for causing the processor to perform operations comprising identifying the real-world factor by:

receiving an image of the user; and

identifying an article of clothing worn by the user in the image, wherein modifying the characteristic of the avatar comprises modifying an avatar outfit worn by the avatar, wherein the avatar outfit corresponds to the article of clothing worn by the user.

7. The system of claim **1**, wherein the memory further stores instructions for causing the processor to perform operations comprising identifying the real-world factor by:

receiving an image of a tag attached to an article of clothing; and

determining the geolocation associated with the user based on geolocation of a mobile device of the user; and

causing an outfit or content associated with the article of clothing and the geolocation to be displayed on the display screen of the user interface while the mobile device of the user is within a threshold distance of the geolocation.

8. A computer-implemented method comprising:

identifying, by a processor, a real-world factor associated with a user, wherein identifying the real-world factor includes:

determining a geolocation associated with the user,

identifying a sporting event venue associated with the geolocation,

determining a first sports team and a second sports team that are scheduled to appear at the sporting event venue within a threshold period from a current time,

determining a residence location of the user, and

determining that the first sports team is associated with the residence location of the user:

modifying, by the processor, a characteristic of an avatar based on the real-world factor, wherein modifying the characteristic of the avatar includes modifying an avatar outfit worn by the avatar, wherein the avatar outfit is associated with the first sports team; and

causing the avatar to be displayed on a display screen of a user interface.

9. The method of claim **8**, wherein the real-world factor is at least one of:

a location, a velocity, an altitude, weather, time of day, mood or sentiment of previous messages associated with the user, trends or popularity, or a past purchase made by the user.

10. The method of claim **8**, wherein modifying the characteristic of the avatar comprises

modifying an avatar outfit or accessory worn by the avatar, wherein the avatar outfit or accessory is associated with the real-world factor.

11. The method of claim **8**, wherein

determining the geolocation associated with the user is based on geolocation information from a mobile device of the user.

12. The method of claim **8**, wherein identifying the real-world factor comprises:

determining the geolocation associated with the user and movement information associated with the user based on a geolocation and movement information from a mobile device of the user; and

identifying a context associated with an electronic communication based on the geolocation and the movement information, wherein modifying the characteristic of the avatar comprises modifying an avatar outfit worn by the avatar, wherein the avatar outfit is associated with the geolocation and the context.

13. The method of claim **8**, wherein identifying the real-world factor comprises:

receiving an image of the user; and

identifying an article of clothing worn by the user in the image, wherein modifying the characteristic of the avatar comprises modifying an avatar outfit worn by the avatar, wherein the avatar outfit corresponds to the article of clothing worn by the user.

14. The method of claim **8**, wherein identifying the real-world factor comprises:

receiving an image of a tag attached to an article of clothing;

determining the geolocation associated with the user based on geolocation of a the mobile device of the user; and

causing an outfit or content associated with the article of clothing and the geolocation to be displayed on the display screen of the user interface while the mobile device of the user is within a threshold distance of the geolocation.

15. A non-transitory computer-readable medium storing instructions that, when executed by a processor, cause the processor to perform operations comprising:

identifying real-world factor associated with a user, wherein identifying the real-world factor includes:

determining a geolocation associated with the user,

identifying a sporting event venue associated with the geolocation,

determining a first sports team and a second sports team that are scheduled to appear at the sporting event venue within a threshold period from a current time,

determining a residence location of the user, and

determining that the first sports team is associated with the residence location of the user:

modifying a characteristic of an avatar associated with the user based on the real-world factor, wherein modifying the characteristic of the avatar includes modifying an avatar outfit worn by the avatar, wherein the avatar outfit is associated with the first sports team; and

causing the avatar to be displayed on a display screen of a user interface.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 10,454,857 B1
APPLICATION NO. : 15/583142
DATED : October 22, 2019
INVENTOR(S) : Blackstock et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

In Column 20, Line 45, in Claim 1, delete “snorts” and insert --sports-- therefor

In Column 21, Line 54, in Claim 8, delete “user:” and insert --user;-- therefor

In Column 22, Line 2, in Claim 10, after “comprises”, insert --:--

In Column 22, Line 58, in Claim 15, delete “user:” and insert --user;-- therefor

Signed and Sealed this
Fifteenth Day of December, 2020

Andrei Iancu
Director of the United States Patent and Trademark Office